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Montana Outdoors

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MARCH–APRIL 2015

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IN THIS ISSUE:

TALKATIVE TAILS

THE GREAT PORCUPINE MYSTERY

SAUSAGE MAKING WORTH WATCHING

MONTANA'S NEW OUTDOOR HALL OF FAME

Montana Fish, Wildlife & Parks

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Montana Outdoors

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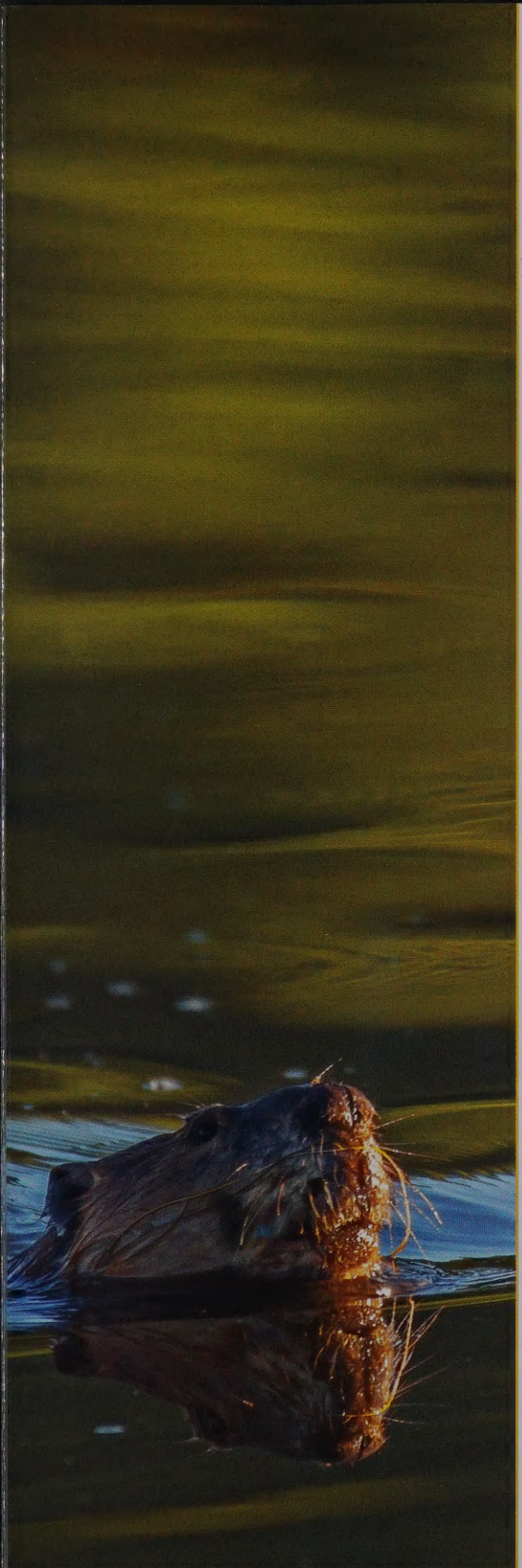


DANGER ANNOUNCEMENT
See page 28 to learn how beavers and other wildlife use their tails to communicate warnings, trick predators, and advertise romance. Photo by Kevin Dietrich.

FRONT COVER
We convince Montana's "Mushroom Whisperer" to divulge his morelling secrets. See page 16. Photo by Ian Privette.

Making forage with fire

In the article "Where Are All the Elk?" (September-October, 2014), the author asks, "How can we lure elk back to our national forests?" Back in the late 1970s, I and others asked the same question regarding an area located in the Big Belt Mountains east of Helena. Historically a grasslands kept open by periodic wildfire, the area had evolved—due to decades of fire suppression—into dense stands of sagebrush and young Douglas fir with little forage. In winter, the elk would have to camp out on ranchlands and consume haystacks and meadows to survive. We prescribe-burned large areas and then documented the dramatic increase in grass forage in the following years. The bottom line was that, yes, we can alter national forest vegetation to attract elk ecosystems by mimicking nature using prescribed fire.

Everett M. "Sonny" Stiger
U.S. Forest Service (retired)
Helena

Faith in the department

An honest thank you to Jeff Hagener and all Montana Fish, Wildlife & Parks staff for a great effort managing Montana's fish, wildlife, wildlife management areas, state parks, the Hunter Education Program, *Montana Outdoors*, and everything else your agency is responsible for. Hats off also to the Fish and Wildlife Commission for all the tough decisions it makes amid controversy and criticism. Anyone who spends time at state parks like First Peoples Buffalo Jump and Bannack, or fishes the Madison, or hunts in the Crazy Mountains, or takes part in any other outdoor recreation your department manages can see steady forward progress and much improvement on the ground.

FWP PRIORITY
Where Are All the Elk?
FWP researchers found them. Now they're trying to figure out how to get the animals back onto public land. By Tom Dickson

Management of hunting and fishing is tricky and most times comes down to funding. As a native Montanan, I don't want to pay more for my outdoor recreation. Yet when I look at the year-round recreational opportunities provided by a hunting license, fishing license, conservation license, upland bird license, migratory bird stamp, and state lands access fee, the cost of all that opportunity is minimal compared to the cost to participate in any one of those activities. The price of gear, fuel, food, and lodging adds up to far more for just one outing than the cost of a license for an entire year. So if my license fees increase slightly to make it all work, I put faith in our FWP staff to spend that money the best they can. In the meantime, keep up the good work and thanks again, FWP, for making Montana's outdoor recreation second to none.

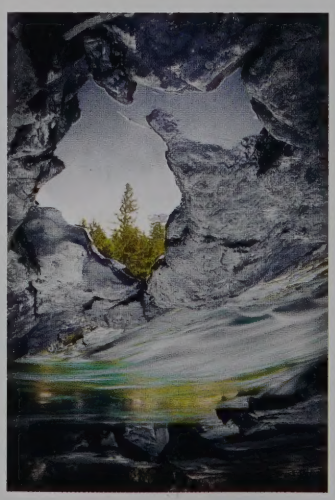
Ben Sautter
Montana City

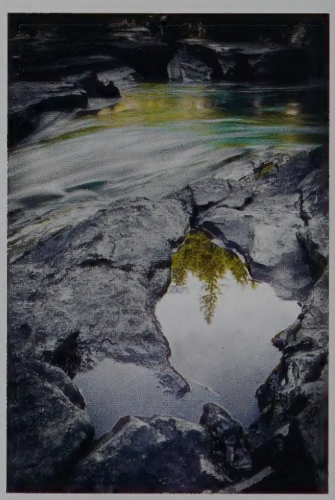
Downside up?

We recently received our 2015 photo issue and the pictures are wonderful. However, the one on page 39, by Bill McDavid, completely puzzled me—until I turned the magazine upside down. Then it made complete sense: rocks at the top, water flowing over a small rapids, and a serene pool with a reflection of a tree. I'm quite sure you have the picture upside down. Didn't the photographer complain?

Linda Karst
Ballantine

Art director Luke Duran responds: Good eye, Linda. It turns out that the photographer asked that we consider the photo in its upside-down format. He said he preferred that unique perspective on the natural world. So yes, it's upside down, but it's not a mistake. Like many readers, we originally thought the shot (as printed, below left) was taken from within an ice cave looking at trees on the outside, with a stream running through the cave. Either way you look at it, the photograph is still stunning.





Corrections

Several readers wrote to point out that the western red cedar (Outdoors Portrait, September-October) is not a true cedar but technically a juniper and a member of the cypress family. True cedars have needle leaves rather than small, scalelike leaves and are native only to the Old World. Both true cedars and New World "cedars" are valued by cabinetmakers for their durable and fragrant wood.

Readers also noticed an error in the FWP at Work feature of our November-December issue, in which we incorrectly wrote that Twitter messages have a 140-word limit. In fact the Twitter limit is 140 characters.

Finally, the photo of three grizzly bears by Jesse Lee Varnado on page 26 of the January-February 2015 photo issue was taken in the Bob Marshall Wilderness, not in Glacier National Park.

Speak your mind

We welcome all your comments, questions, and letters to the editor. We'll edit letters as needed for accuracy, style, and length. Reach us at Montana Outdoors, P.O. Box 200701, Helena, MT 59620-0701. Or e-mail: tdickson@mt.gov.

Venison Italian Sausage

By Tom Dickson | Yield: 14 pounds of sausage

They say the two things you don't want to see being made are a bill in Congress and sausage. I can't attest to what happens in the nation's capitol, but I sure wouldn't mind anyone watching me make sausage. It's a beautiful sight.

The old notion that sausage is composed of butcher shop waste and floor sweepings might have been true years ago before federal food safety inspections. But these days sausages are safe and even healthy. You can find artisanal varieties made with chicken, turkey, or the traditional beef or pork, mixed with apples, leeks, onions, various cheeses, and any number of spices and herbs. Home sausage makers use fresh, quality ingredients to create delicious links and patties.

Quality sausages are nothing new. For thousands of years, Europeans have been combining ground meat and fat with salt and spices and stuffing the mixture into cleaned pig intestines. Today, the Polish kielbasa, German bratwurst, Danish pølsevogn, and Spanish chorizo are practically national dishes.

Making game sausage requires very little talent or equipment. I recently purchased a powerful electric grinder, but for years got by with my mom's old hand grinder. You can pick one up at a secondhand store for a few bucks. If going electric, try to resist buying the cheapest models. Their wimpy motors and substandard (often plastic) components make grinding slow and frustrating.

I began by making burger—85 percent venison mixed with 15 percent pork fat. That was so easy I started looking for recipes for sausage—basically burger with spices and a bit more fat. Over the years I've settled on several varieties that my wife and I eat during the year. Our favorite is venison Italian sausage (see recipe at right).

—Tom Dickson is editor of Montana Outdoors.

INGREDIENTS (for a big batch)

- 5 lbs. venison, from any part of the animal, trimmed of all fat and as much white connective tissue as possible.
- 7 lbs. pork shoulder (also called Boston butt or pork shoulder butt)*
- 2 lbs. pork fatback*
- 6 T. table salt
- 5 T. sugar
- 2 T. crushed garlic
- 5 T. fennel seeds, toasted then crushed
- 5 T. chopped parsley
- 2 t. paprika
- 2 t. cayenne
- 2¾ c. red wine vinegar, red wine, or water, all ice cold**

* Note that surfaces, tools, or hands that touch raw pork meat or fat should be washed with hot, soapy water afterward before contact with other food.

** The cold liquid is essential for dispersing the spices and helping the protein suspend the fat in the sausage.

DIRECTIONS

Place grinder auger, medium die, blade, and a large bowl outside (if in winter) or in the freezer for 60 minutes or more to cool.

Meanwhile, cut the meat and fat into 1-inch chunks. Spread out on cookie sheets and place in freezer or outside for 30 to 60 minutes until slightly but not totally frozen.

Assemble grinder and begin feeding in the venison and pork, roughly equal portions of each for the right mix of meat and fat.

In a small bowl, mix the remaining ingredients to create a slurry.

Sprinkle the spiced slurry over the 14-pound batch of ground meat and fat and thoroughly mix, using your hands (I wear clean, lined rubber kitchen gloves). Even gloved, your hands should ache from the cold. That means the mixture is still cold enough to keep bacteria from forming and to prevent the fat from smearing.

Form into patties or stuff into casings using a sausage stuffer. Cover in plastic wrap and freeze, or grill, sauté, or poach to an internal temperature of 145° F., let rest 5 minutes, and consume.

SHUTTERSTOCK

It's Your Call

As you read this in late winter or early spring, FWP employees across the state are working to manage your fish and wildlife. Crews are wrapping up prairie and forest aerial counts of pronghorn, deer, elk, and moose. Wildlife biologists and game wardens are working with landowners to fence deer and elk from haystacks. Wolf specialists are stringing flagging along electric fences to keep wolves from going after newborn calves. Maintenance staff are cleaning up fishing access sites and repairing broken signs and boat ramps. Fisheries technicians are finishing creel surveys of ice anglers and fixing nets in preparation for spring fish surveys. Biologists are planning summer habitat improvement projects. FWP front office staff are selling new hunting and angling licenses, while back office crews are managing computer systems in preparation for the first big game lottery drawings.

This work, along with everything else we do throughout the year, takes money. Unfortunately, FWP will soon be running short. The last time the Montana Legislature approved a resident license fee increase was in 2005, a decade ago. Since then our revenue has remained flat even as costs—everything from fencing to fuel—have inched up with inflation. Yes, gas for game wardens' and biologists' trucks, essential equipment for covering this huge state, dipped below $2 a gallon this winter. That was welcome news, but not long ago gas cost nearly $4 a gallon, and prices could be back in that neighborhood before we know it.

Without action to solve FWP's current budget shortfall, the department may have to cut back on the Block Management Program, lake and reservoir stocking, game law enforcement, game damage assistance, hunting opportunities, and more.

Meanwhile, in recent years FWP has been required to do more tasks, like timber planning and harvest on state wildlife management areas, managing wolves and bison, and trying to prevent the endangered species listing of the arctic grayling, wolverine, fisher, and sage-grouse (which we recently succeeded in doing with the first two species and are hopeful about accomplishing with the latter two). Throw in having to monitor for brucellosis and aquatic invasive species, help cities manage urban wildlife, and predict potential problems to habitat and wildlife populations from various types of new development, and it's clear that our flat revenue stream isn't providing enough money to make ends meet.

As a result, right now we're facing a $5.75 million annual shortfall. The deficit is no surprise. Ten years ago legislators and FWP predicted that the fee increase at the time would last only until 2015, and that has come true.

So what's to be done? In anticipation of the deficit, we've already cut $1.4 million annually from our operational costs. The next step will be for the current legislature to address the remaining funding gap. Solutions will come down to one, or some combination, of three choices:

- Further cut existing fish and wildlife management and conservation programs.
- Shift some "earmarked" funds to other programs.
- Raise resident fishing and hunting license fees.

If the legislature decides to further cut existing programs, we'll have to decrease game population surveys, reduce hunting opportunities, let some fishing access sites fall into disrepair, reduce assistance to landowners who have game damage problems, decrease enforcement of game laws, consider closing fish hatcheries, and more.

If lawmakers favor shifting earmarked funds from programs like Upland Game Bird Enhancement, Block Management, Habitat Montana, and wolf monitoring, those and other earmarked programs would have to be cut substantially.

Last year a governor-appointed citizen advisory council, coordinating with a legislative interim committee, recommended increasing fishing licenses by $6 and hunting licenses by $8 (upon adopting the recommendation, the Environmental Quality Council reduced the fishing license increase to $3). In addition, the advisory council recommended discounting licenses for seniors at age 67 instead of the current 62, and standardizing the price of most other free or discounted licenses at 50 percent of what other residents pay.

Those fee adjustments would solve most of the funding problem while also—unlike the other options—maintaining fish and wildlife opportunities at today's levels for four more years.

It's not up to FWP to decide how to solve the budget shortfall. Our responsibility is to explain what will likely happen to fish and wildlife management and conservation under the various proposed scenarios. As to which option is best for Montana, that will be decided by you and your representatives at the capitol sometime in the next two months.

—**M. Jeff Hagener,** *Montana Fish, Wildlife & Parks Director*

DENVER BRYAN

KENTON ROWE

MAP MAKER

LYDIA BAILEY
GIS Manager, Helena

At its most basic level, GIS (Geographic Information System) is a computer system that captures and displays information in map form. The maps we create in the GIS Unit of FWP's Data Services Bureau allow us to deliver information in an easy-to-understand format to assist department field staff as well as hunters, anglers, and other recreationists. For instance, we might map locations of a grizzly moving through ranchlands, or various spawning tributaries that bull trout use. Or we can create a map of domestic sheep ranches and overlay that with a map layer of bighorn sheep locations so biologists can determine where wild sheep may be at greatest risk of contracting disease.

I was introduced to the power of GIS as a student at the University of Vermont in the 1980s while getting my wildlife biology degree. When I moved to Montana, I wanted to work for FWP because the department's mission aligns with my personal values. Luckily, a position opened requiring GIS skills that I happened to have. That was in 1992, and I've been with FWP ever since.

What I like most about working with GIS is that it's both a science and an art. The science is the geography, biology, and technology that go into the data and maps. The art comes from using color, space, type, and other graphic elements to best emphasize the information a particular map is meant to convey, like the movements of elk throughout the year, or the relationship between sage-grouse breeding leks and oil and gas development sites. With GIS, I'm a scientist and an artist at the same time, which I find very rewarding.

Helena photographer **CHRIS McGOWAN** took this shot of a drake common goldeneye last March at Freezout Lake during the spring waterfowl migration. "I was on a dike just east of U.S. Highway 89 when I saw four goldeneyes in a slough," he says. "Earlier I'd been watching some tundra swans, but the colors of those ducks really caught my eye. I slid down the bank to the water's edge and lay there for a while. They came to within about 15 or 20 yards of me and then started getting nervous. I was able to photograph this one just as he was taking off. Unlike mallards, which pop straight up from the water, goldeneyes take a running start. I like the captured motion in this shot, especially the spray of the water. You can tell he's moving fast and about to lift off." ■

35 Average inches of annual precipitation at a site roughly 12 miles northeast of Bozeman, making it the wettest spot in Montana.

SOURCE: The National Climatic Data Center.

Skwala!

Fly anglers are turning their attention to western Montana right about now, anticipating the Skwala stonefly hatch. This smaller cousin of the famous salmonfly starts coming off the water between mid-March and late April. Top waters include Rock Creek and the Bitterroot, Clark Fork, and Big Hole Rivers.

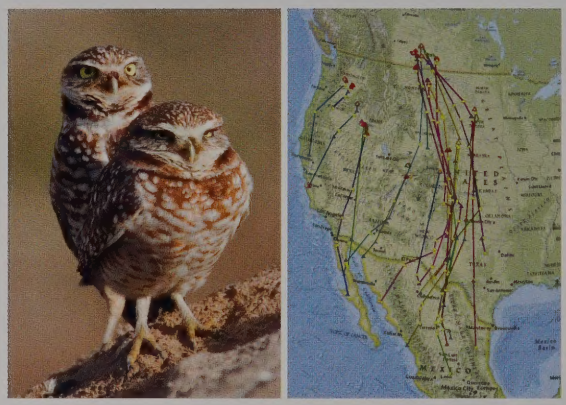
Don't expect solitude. Anglers from Idaho and Washington especially are dialed in to the hatch and regularly cross the border to fish for trout feeding on Skwala duns or underwater nymphs. Call local fly shops for details, patterns, and conditions.

NONGAME WILDLIFE

Prairie owls go the distance

Burrowing owls don't seem like long-distance travelers. One of the few birds to nest underground—an adaptation to their treeless prairie environment—the 9-inch-tall raptors feed on grasshoppers, mice, voles, birds, and snakes they catch within a relatively small home area.

That's one reason why the researchers with the Idaho Co-op Research Unit and Environment Canada were surprised to document burrowing owls flying nearly 2,000 miles from eastern Montana to central Mexico last year.



Researchers tracked owls flying nearly 2,000 miles to Mexico.

The team fitted 30 burrowing owls in western Canada and the United States with tiny backpack-mounted satellite transmitters. The devices emit signals that researchers track to learn migration routes and destinations. The goal, says project leader David Johnson, is to develop a conservation plan to ensure the owl doesn't end up on the endangered species list. Burrowing owl populations are declining in the United States, and the species is listed as endangered in Canada—mainly caused by the conversion of shortgrass prairie to crops, habitat becoming fragmented by roads, vehicles colliding with the low-flying birds, and increased use of pesticides that kill grasshoppers.

The satellite transmitters weigh just 6 grams, about the same as a quarter, and contain small solar cells that recharge the batteries.

Three burrowing owls from Montana were tracked by the team. One ended up in west-central Mexico, another landed outside the city of Guadalajara, Mexico, and a third was found dead before it was able to migrate south. Of the 22 owls that migrated with their transmitters, 17 wintered in Mexico.

The two surviving Montana owls will soon fly back to the C.M. Russell National Wildlife Refuge to breed. The birds nest in abandoned badger, swift fox, or prairie dog dens. ■

ECONOMIC ACTIVITY

Fishing out their wallets

A new study by FWP shows that hunters and anglers spend more than $1 *billion* (that's with a "*b*") each year across Montana on gear, food, motel rooms, guides, gas, and other trip expenses.

Department analysts conducted surveys to find out how much hunters and anglers spent on their most recent fishing or hunting trip. They then multiplied the average amounts by the number of days that hunters and anglers spend hunting and fishing in Montana each year.

Examples from the expenditures report (total dollars spent on trips each year, residents and nonresidents combined):

- Elk hunters: $139 million
- Pheasant hunters: $16 million
- Lake and reservoir anglers: $183 million
- River and stream anglers: $724 million

For report details, visit fwp.mt.gov and click on "Doing Business," "Reference Info," "Surveys," and "Social & Economic Surveys." ■

CLOCKWISE FROM TOP LEFT: CARTOON ILLUSTRATION BY MIKE MORAN; KEN ARCHER; GLOBAL OWL PROJECT; JOHN LAMBING; MONTANA FWP; *MONTANA OUTDOORS*; SHUTTERSTOCK

The Rocky Mountain Front Heritage Act, passed by Congress and signed into law this past December, designated 67,000 acres along the Front as wilderness, the first new wilderness in Montana since 1983.

WILDERNESS

The Front finally gets its due

Befitting the 50th anniversary of the Wilderness Act, commemorated in 2014, Montana received its first piece of new wilderness in 31 years when President Barack Obama signed legislation that included the Rocky Mountain Front Heritage Act on December 19.

Sponsored by U.S. Senators John Tester and John Walsh and U.S. Representative (now U.S. Senator) Steve Daines, the act designated 67,000 acres west of Choteau and Augusta that will become part of the Bob Marshall Wilderness Area Complex. An additional 208,000 acres were protected in a unique "conservation management area" that allows traditional practices such as cattle grazing, firewood harvesting, and some motorized travel, but prevents expansion of those activities.

A diverse coalition supporting the act included the Montana Wildlife Federation, The Wilderness Society, the Montana Wilderness Association, local ranchers and outfitters, 25 state sportsmen organizations, 28 businesses and professional groups, 20 state and national conservation and wildlife organizations, and dozens of current and retired elected officials and state and federal agency leaders.

"Passage of this act is testimony to community leadership," says Roy Jacobs, a ranch worker in Pendroy who has fought to protect the Front since 1977. "It never hurts to dream big."

Also signed into law was the North Fork Preservation Act, which protects about 383,000 acres west of Glacier National Park from energy exploration. The legislation completes a transboundary agreement with British Columbia and the Canadian government to protect the entire Flathead River drainage from energy development. ■

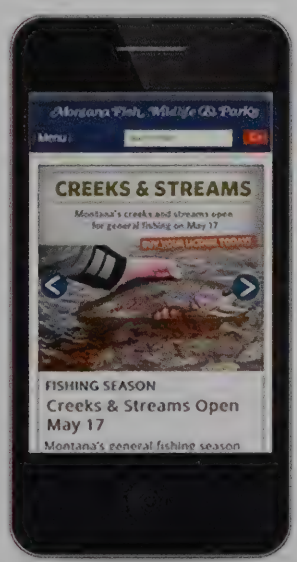
FWP website now easier to see and use

FWP has redesigned its website to be mobile friendly. The content reflows to fit the width of any browser window, whether it's on a smartphone, tablet, desktop computer, laptop, or smart TV. "The percentage of people visiting the website on mobile devices has grown exponentially," says Cheryl Aldrich, FWP webmaster. "Today 40 to 50 percent of our visitors are using smartphones or tablets. This redesign accommodates their devices much better than before."

The website also uses a simpler navigation system, including a new color scheme, to make information easier to locate. A new site index, like that in the back of a book, contains the most-searched-for words on the website and is an additional way users can find what they want.

Another new feature allows visitors to sign up for automatic e-mail updates on topics such as permit application deadlines, season closures, and breaking FWP news.

"What we didn't change is the website's basic structure and content," says Aldrich. "All the information that was there before is still there, for the most part in the same place." ■



Where Have All the Porcupines Gone?

In western Montana's mountains, once-numerous "quill pigs" have disappeared. Biologists have theories but, so far, no answers. **By Ellen Horowitz**

It's hard to drive anywhere in Montana and not see a land or water feature named after the porcupine. There's Big and Little Porcupine Creeks near Forsyth, Porcupine Saddle near Darby, Porcupine Basin by Lincoln, Porcupine Butte in the Crazy Mountains—the list goes on. In the *Montana Atlas & Gazetteer* I found geographic references to the prickly rodent in 21 of the state's 56 counties. And those counties are scattered across the state, indicating that when most places were named by European settlers in the late 1880s and early 1900s, porcupines were widespread.

That's still the case in much of Montana. When my husband and I head east of the Continental Divide to some of our favorite haunts, we often see porcupines or, more frequently, the gnawed branches of trees and brush indicating their presence. (The rodents are after the nutritious inner bark, known as cambium.) We know of a fellow who hunts upland birds near Malta and runs into porcupines so often that he invented a device for holding his dog's mouth open while he removes the quills. There's no shortage of porcupines in eastern and central Montana.

West of the Divide, it's another story.

The last time my husband and I observed porcupines in the mountains near our cabin in the northern Whitefish Range was in the mid-1990s. Friends and acquaintances say the same thing, that porcupines seem to have disappeared from the high-elevation evergreen forests of western Montana.

Kerry Foresman, professor emeritus at the University of Montana and author of *Mammals of Montana*, told me he routinely saw porcupines while working in the mountains as a UM undergraduate in the 1960s. When he returned to the university as a professor in the 1980s, the quill-covered rodents were still a common sight. But by the end of that decade, he saw fewer and fewer. Colleagues across the western states and Canadian provinces witnessed the same decline.

"Where have the porcupines gone? That's the $64,000 question," says John Vore, Montana Fish, Wildlife & Parks Game Management Bureau chief and previously the department's wildlife biologist in Kalispell. When he began working in the mountains of northwestern Montana in the early 1990s, Vore says he was surprised by the lack of porcupine tracks and freshly gnawed trees in what should have been prime habitat. Older biologists in the area told him that porcupines had been widespread and numerous during the 1970s and '80s in the South Fork and North Fork of the Flathead. The rodents often became pests around trailheads and camps. Porkies chewed on rubber brake lines, fan belts, and hoses of vehicles parked overnight, gnawed ax handles and canoe paddles for the salt residue left from sweaty hands, and consumed wood signs and even outhouses.

LUCKY CHARM

Humans did not always see porcupines as a nuisance. Native Americans have long regarded the animal with respect and even admiration. The large rodent was viewed as a minor animal spirit, usually representing self-defense and caution. Some tribes also associated porcupines with humility, modesty, and good luck. The animals supplied food when other game was scarce, and their stiff quills were softened, dyed, and woven into leather shirts, medicine bags, and moccasins.

Early settlers also held a magnanimous view toward porcupines. Trappers and woodsmen never killed them without cause, because the slow-moving, easy-to-approach rodents could be an emergency food source to someone lost in the wilderness. Settlers believed, as did Indians, that killing a porcupine was bad luck.

Attitudes began to change in the 1930s as porcupines consumed young trees planted by the fledging U.S. Forest Service to replace

DISAPPEARING ACT Porcupine numbers in eastern Montana and western Montana valleys remain steady. So why have numbers declined at higher elevations in the state's western forests? No one knows for sure, but one factor could be the species' low reproductive rate.

those logged or lost to wildfire. Soon the rodents were depicted as a scourge of America's national forests. A 1936 Forest Service press release in the *Spokesman-Review* called porcupines a "new major menace to livestock and timber in Montana's national forests." So abundant were porcupines, the agency claimed, "that they are causing almost as much loss to timber as fires." In 1955, zoologist and ranger-naturalist R.R. Lechleitner wrote in *Mammals of Glacier National Park*, "Porcupines are quite abundant...and appear to be more numerous in the higher regions." He related a story of counting two dozen porcupines in a single evening while driving roughly 24 miles along the Going-to-the-Sun Road from the Loop to Sun Point.

Longtime Montana Outdoors *contributor Ellen Horowitz lives in Whitefish.*

By the 1950s, porcupine eradication programs were in full swing on national forests and private timber lands throughout the United States. Strychnine-laced salt blocks were used to control porcupine numbers in some national forests until 1972, when the use of toxicants on federal lands was banned.

NO SMOKING GUN

Though federal poisoning killed many porcupines, Vore doesn't believe it explains why the animals are so scarce today. He points out

PETTING NOT ADVISED

Porcupines are the only North American animal that grows quills. The shafts are soft but not hollow, containing an airy, foam-like core made of keratin that adds quill strength.

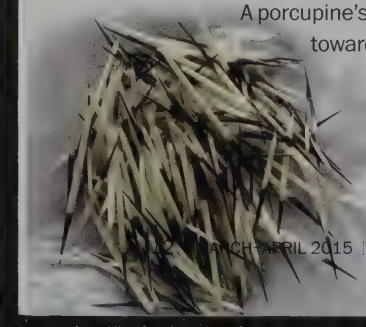
Roughly 30,000 of the 2- to 4-inch-long quills cover the porcupine's backside. The dark end of each sharp, cream-colored quill is covered in barbs, making removal from an overaggressive dog's mouth extremely difficult. If not removed, quills work themselves deeper into tissue and then cause infection and intense pain. Young coyotes and wolves that attack porcupines often starve to death or die of dehydration because of barbs embedded in their mouth or tongue.

Contrary to popular belief, porcupines can't throw or shoot their quills. The flick of a porcupine's muscular tail is so swift that it's imperceptible to the human eye and creates the impression that the quills were actually flung at the dog or other intruder.

The porcupine's 360 degrees of defense

A porcupine's quills and guard hairs are piloerectible, meaning they can be raised and lowered. When at rest, the quills lie flat and point toward the back. When roused, they spring up and point in random directions to create the porcupine's formidable defense. Quills also contain fluorescent pigments that make them look brighter and act as a warning sign to nocturnal predators.

Quillwork is considered a unique Native American art form. Native people collected and dyed quills for ornamentation. They gathered them by throwing a blanket over the animal's back and then pulling it off to harvest the freshly embedded quills, allowing the porcupine to continue on its way unharmed.



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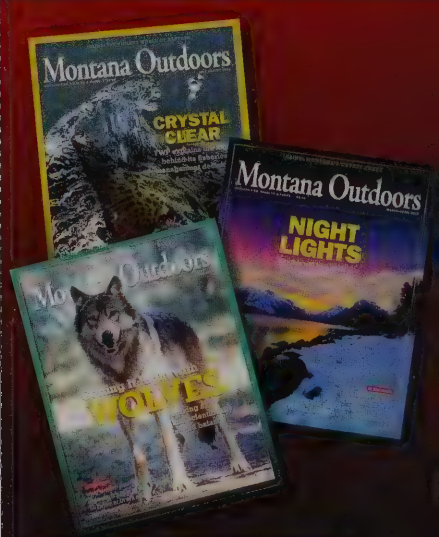

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MISGUIDED MANAGEMENT For decades porcupines were mistakenly thought to harm forests. U.S. Forest Service workers shot porcupines as pests and, until 1972, even spread strychnine on trees in some national forests to poison the rodents.

that porcupines were common into the 1980s, years after the most intensive eradication programs ended. What's more, adds Glacier National Park wildlife biologist John Waller, no poisoning took place in the park, yet porcupines are now rare there, too. "It's a notable occurrence when you see one," Waller says.

Could fishers and mountain lions, which purposely hunt porcupines, be to blame? Probably not, says Vore. Even though Montana's mountain lion population has increased since the 1980s, the predators don't prey on enough porcupines to account for the massive declines. Fisher numbers also have grown, and these large members of the weasel family are able to kill any porcupine they find by biting the rodent's snout, flipping it over, and attacking its vulnerable belly. Yet fisher populations have low densities, so "even when numbers are up, there are never a lot of fishers around," Vore says.

Another possibility is climate change. "Fire frequency and severity and mountain pine beetle epidemics have impacted thousands upon thousands of acres of habitat and the trees that porcupines need," says Chris Hammond, FWP nongame wildlife biologist in Kalispell.

One factor no one can rule out is the possibility of an unknown epidemic afflicting

CLOCKWISE FROM TOP LEFT: KEVIN DIETRICH; MATIONAL MUSEUM OF FOREST SERVICE HISTORY, MISSOULA, MT; WWW.SHANNONSTEPHENSPHOTOGRAPHY.COM; MONA DOEBLER, SHUTTERSTOCK

A SLOW LIFE AMONG TREES

The North American porcupine (*Erethizon dorsatum*—Greek and Latin for "excitable back") is found throughout Canada and the western United States.

These usually nocturnal animals are strictly herbivores, feeding on leaves and stems of a wide range of woody and herbaceous plants. During winter their diet consists primarily of tree bark and conifer needles.

Porcupines spend much of their time in trees, eating, resting on branches, and sleeping in hollow trunks. Excellent climbers, porcupines have long curved claws for grasping tree bark, and their pebble-textured footpads provide traction. A porcupine uses its powerful tail when climbing by pressing it against the trunk as an additional point of support. The tail's rough underside further reduces the chance of backsliding.

Kerry Foresman, author of *Mammals of Montana*, says that while porcupines can kill an individual tree by eating too much of its bark, the animals have never been numerous enough to damage entire forest stands. "A lot of that was exaggeration," he says of reports in the mid-20th century claiming that porcupines were devastating forests. "Porcupines are few and far between even when you have a healthy population," he says.

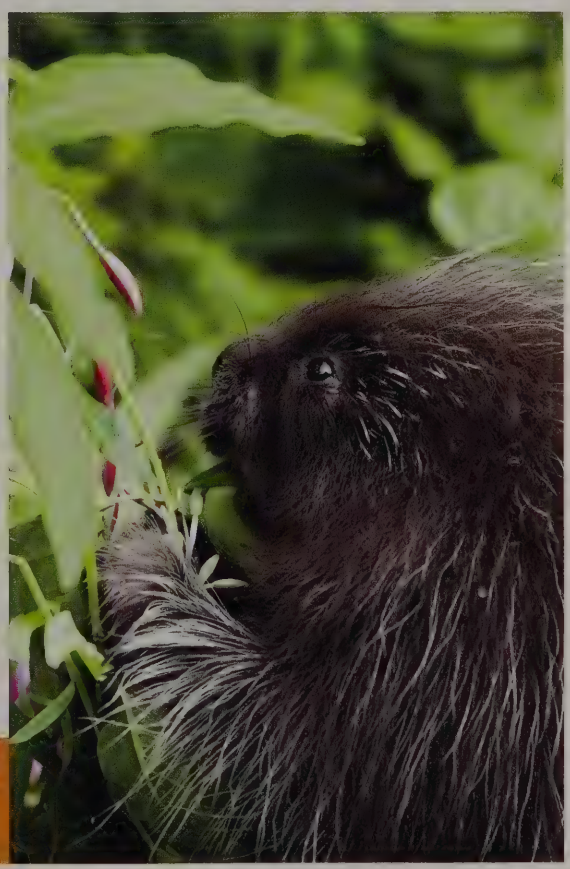
A porcupine has a small home range, just 10 to 100 acres in summer and as little as 1 acre in winter.

Mating occurs in fall. Porcupines mate just as other mammals do, though, not surprisingly, much more carefully. When the female is ready, she lifts her tail and allows the male to mount. During the process, he lets his forelegs go limp at his side or places his paws on her quill-less undertail.

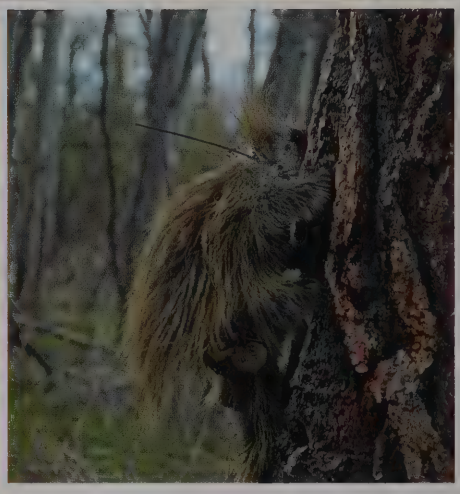
Unlike most rodents, porcupines have extremely low reproductive rates, giving birth to just one baby each year. Following a seven-month gestation—about the same length as a deer's—the porcupette is born. The youngster nurses for four months before being weaned. Females are typically one and a half years old and males four years old before they can breed. In the wild, porcupines rarely reach ten years old.

Porcupines are best known for their quills, which cover their back and tail and provide the stocky animal with excellent self-defense (see "Petting Not Advised," page 12). Guard hairs, twice as long as the quills, make the animal look larger than its actual size of just 20 to 40 pounds.

Porcupines are one of the slowest animals in Montana, moving over the ground at a leisurely amble. And why not? When few other animals dare bother you, and all the food you need is within a few acres, what's the rush?



EAT YOUR GREENS In summer, porcupines forego tree bark for leaves, flowers, seeds, stems, and shoots.



HANDLE WITH CARE University of Montana professor emeritus Kerry Foresman (far left) advises graduate student Katie Mally (near left and scene) on a study of porcupine habitat in the Bitterroot Valley. Wearing welder gloves for safety, Foresman and Mally fit the rodents with radio transmitters allowing them to track the animals (right) and learn that wetlands containing cottonwoods and hawthorn are preferred habitats.

porcupines. Says Vore, "There may be a porcupine or rodent-specific disease out there that we just don't know about."

STUDY BEGINS

Hoping to start finding some answers, in 2006 Foresman enlisted a graduate student, Katie Mally, to study the differences between high-elevation porcupines, which seemed increasingly rare, and low-elevation porcupines, still common in western Montana. Mally surveyed wildlife biologists, foresters, landowners, and others to learn of any sightings since 1996. Of the 183 instances where people reported seeing porcupines in the previous decade, not a single one was at an elevation above 4,000 feet.

Undaunted, Mally spent the next summer scouring western Montana mountains looking for porcupine sign. Her search came up empty. "If she had located some porcupines, she could have radio-collared them and found out what habitats they used, what they ate, reproductive success, causes of death, that sort of thing, in order to start getting at what might be behind the declines," says Foresman.

With no high-elevation porcupines to study, Mally instead began documenting porcupine habitat in the lower Bitterroot Valley. Funded by an FWP grant, she worked with staff of the Lee Metcalf National Wildlife Refuge, FWP biologists, and several landowners to trap porcupines and fit them with radio transmitters. After a year of study, Mally found that porcupines were most common in areas with low-elevation wetlands containing hawthorn and cottonwoods.

"That was important baseline information, but unfortunately we're no closer to understanding what happened to the high-elevation porcupines," says Foresman.

Foresman suspects that a wide range of factors are at play. "The biggest of all could be the fact that porcupines produce just one baby each year," he says. "When a female rabbit dies, she probably has produced 10 or 12 babies. But when a female porcupine is killed—by disease, predators, or shooters—she might have only produced one or two young in her lifetime," he says. "It doesn't take much to knock down such a slow-growing population and keep it from recovering."

Foresman notes that porcupines are still commonly killed by tree nursery owners concerned about their stock and bird hunters hoping to prevent their dogs from getting quilled. Porcupines are classified as an unprotected nongame species that can be shot on sight. "What concerns me most are the porcupines shot just because they are there, for so-called 'sport,'" Foresman says. That indiscriminate mortality, coupled with things scientists still don't understand, like habitat change and disease, could be enough to keep porcupines from ever recovering enough to once again become a common species that people encounter while exploring western Montana's forests.

Scientists continue to seek reports of porcupines at higher elevations. If you see one in the mountains, please report it to Kerry Foresman at foresman@mso.umt.edu or to Chris Hammond at chammond@mt.gov.

A NEED TO GNAW During winter, porcupines use their chisel-sharp incisors to cut through a tree's outer bark to reach the nutritious inner bark, or cambium. The porcupine gnaws by digging its upper incisors into the trunk or branch, then using its lower incisors to scrape, swiveling its lower jaw in a shallow arc with each scrape.

Secrets of a Morelling Master

A day afield with Montana's "Mushroom Whisperer"

By Tom Dickson. Photos by Paul Queneau.

"Here's one," says Larry Evans, reaching under a fallen tree to harvest his find before bounding higher up the charred mountainside. "Here's another," he calls out. On this cloudy mid-June morning, photographer Paul Queneau and I are trying to follow Evans up an impossibly steep south-facing slope of the Swan Range in the Seeley-Swan Valley. Evans scrambles back down the hillside, bent at the waist to see underneath logs or beneath uprooted tree roots where a morel mushroom might hide. "It's a good idea to look from above and below," he advises, before bounding back up the slope like a mountain goat. "Remember," he shouts back at us, "morels like to disguise themselves as pine cones!"

Evans is a morelling master, and keeping up with him—intellectually and physically—is no easy task.

We began our search for the delectable mushrooms along the edge of a 600-acre fire that burned the previous September. The mountainside was black with charred trees, many of them fallen and crisscrossing the forest floor like spilled drinking straws. After driving us to the burn boundary, Evans jumps out of his vehicle and tests the soil temperature by plunging his finger into the duff. "It's about 55 degrees here. Perfect." We follow him through the burned forest and quickly see that the blackened earth has been trampled by previous pickers. "Too easily accessible," Evans explains. "Anyway, it's too dry here. We need more soil moisture."

We drive a half mile to a creek, which Evans says can be a good place to find morels. Creek ravines are humid, contain lots of organic matter, and have a high water table along the banks.

Morels grow where it's wet.

Evans trots off, checking under toppled trees and other structures that hold moisture in the soil. Downed timber and dense tangles discourage commercial pickers, he tells us. So even if a place has been picked over—signaled by footprints and rings of cut morels—it's worth pushing through the heavy brush. "For the professionals, it's all about efficiency," explains Evans, who picked commercially before becoming a morel broker who buys from pickers and sells to restaurants and gourmet food stores. "They don't have time to climb over big logs and can't risk slipping and getting injured." He looks down

JUST WHERE HE SUSPECTED "I imagine I'm a morel, and then look for places that feel like home," says mycologist Larry Evans, of Missoula. The prime locales are in forests burned the previous year where red conifer needles litter the floor, indicating a fire that was not too hot. Morels sprout only when soil temperature and moisture are at the right levels, Evans says.

at the ground. "I'd say there's already been 20 people through here."

You'd think a guy who has picked tens of thousands of morels would tire of looking. Not Evans. "I enjoy more than anything what I call the 'burnacology' of a fire site," he says. "I like to figure out why the fire went where it did. And I like going late, in July and August, after everyone has been through. Then you really can get into the big grays."

Black Belt, Black Dog

Though Montana is home to several renowned mushrooming experts, Evans is the most famous, thanks to an expansive profile in *Outside* that ran in 1998. The 59-year-old mycologist, who has a degree in botany from the University of Montana, has hunted for mushrooms throughout the world, from Japan to Bolivia. In addition to brokering edible fungi, he teaches at various ecological institutes and learning centers, consults for natural resource and public health agencies, writes songs, teaches judo, and works occasionally as a chef. For several years he owned and ran the Black Dog Café in Missoula.

Evans is well known throughout Missoula for his loose, counterculture style. He wears sandals and favors T-shirts bearing mushroom illustrations. Two pigtails of sandy-gray hair swing from under a crocheted cowboy hat as he lopes across the forest floor. "I imagine I'm a morel and then look for a place that feels like home," he tells us. But behind the free-spirited hippie exterior is a disciplined athlete and forest ecologist. Tall, lean, and muscular, Evans moves through the forest with the speed and grace of a woodland creature. Few people know more about the natural roots, berries, mushrooms, and other natural foods that grow in northwestern Montana forests.

As we search the ground for morels, Evans tells us why he opposes overaggressive logging practices that remove too much of the forest canopy. "The best defense against intense forest fires is shade and soil carbon in the form of wet decomposing logs," he says. "You'll still have fires, but they won't be the catastrophic type we've seen in the past decade or so." He adds that slower-burning fires are good for morel production, which benefits local economies. Roughly $2 million worth of morels came off the Ninemile Fire site near Missoula in 2001, he estimates. "The Forest Service needs to start managing more for non-timber forest products like mushrooms."

In deference to his knowledge of all things mycological, and the way he is able to

MUSCLING HIS WAY IN Left: Evans often finds morels by bushwhacking through dense tangles of downed timber where commercial pickers rarely venture. Below: The mycologist, made famous by a profile in *Outside*, describes how fire intensity maps can indicate top picking spots. "I go to where the fire started, because that's where it was likely less intense," he says.

Tom Dickson is editor of Montana Outdoors. *Photographer Paul Queneau lives in Missoula.*

An Insider's Guide to Morelling

Morels are among the most sought-after mushrooms in the United States. The edible fungi look like small gray or tan oval sponges fused to a smooth hollow stem. Scientifically, the morel is the aboveground manifestation of an underground network of fungal threads or tissue known as mycelium. Think of the mushroom as the "fruit" and the mycelium as the "roots." The fruit sprouts out of the earth under certain conditions, usually a mix of warmth and moisture in forests and woods during late spring. Sprouting morels produce spores (think "seeds") that spread in the wind, germinate, and create new mycelium growth. Finding these delicious (when cooked) mushrooms can be difficult for beginners. Tips from mycologist Larry Evans, of Missoula:

WHERE

In Montana, more morels are found west of the Continental Divide than east of it because the soil is moister and forest fires are more frequent. Morels in central and eastern Montana pop up mainly along river bottoms.

Fire sites: Theories abound, but no one can say for certain why morels sprout the year after a fire moves through a forest. What is known is that most morels found in the West are on burn sites. Find fire dates, sites, and maps from the previous year (or the year before that, but no later) on the U.S. Department of Agriculture's online Remote Sensing Applications Center or the InciWeb Incident Information System. Fires are far more frequent in some years than others. For instance, not many burned in 2014. Also, even if you find a fire site, it may be miles from the nearest road, so access may be tough or even impossible.

> Look for mosaics containing black, brown, and green vegetation. Key in on areas where reddish needles litter the partially burned forest floor.

Riparian areas: "Blond" (also known as "river") morels sprout in dappled light along river bottoms and islands among cottonwood stands, and near ponds and lakes beneath dead or dying alder, ash, and elm trees. Exact sites where river morels grow are tough for beginners to find, so you'll usually need to befriend someone who is willing to take you to a secret spot where morels sprout year after year. River mushrooms show up in May and early June, when it's late enough for temperatures to have warmed the soil but not too late that fast-growing vegetation hides the mushrooms from view.

WHEN

Mushrooms start sprouting when soil temperatures reach about 42 degrees. Ideal temperatures are 55 degrees and above. This can be as early as April on south-facing slopes at lower elevations and as late as August on north-facing slopes in subalpine areas. For mid-elevation mountains, the season generally runs from mid-May to mid-June. Early in the season, when conditions are moist, morel pickers want warm days to heat up the soil. Later in the season, when conditions are dry, pickers head out a day or two after a rain.

EQUIPMENT and PERMITS

Most pickers carry a small knife to cut morels off at the base. Any type of carrier bag will do, but a mesh one allows pine needles, insects, and duff to fall through, keeping your bounty cleaner. Also, an instant-read meat thermometer is helpful for testing soil temperature.

Harvest technique

The U.S. Forest Service requires recreational pickers in all national forests to obtain a free personal-use permit. Available at the headquarters offices, permits are usually not transferable to other national forests. In addition, offices are open only on weekdays during business hours, making permits difficult to obtain if you want to collect morels during a weekend. Also, all picked morels must be cut in half—apparently to decrease their value if you try to sell them (a permit for commercial collecting, which has no morel-splitting requirement, costs $50).

WHILE SEARCHING

Once you've located a burn site, focus on the edges of the firescape and other mosaics of black, brown, and green, indicating a slow-moving fire that left a patchwork of both dead and living vegetation. Completely charred "moonscape" areas indicate fires that were too intense for morels to sprout the following year. Key in on burned areas where

Mosaic burn

FUNGI FUN GUY Larry Evans, of Missoula, says being a mushroom expert is no way to get rich. But it does allow him the freedom to teach judo, write music, cook, and, most important, spend time roaming the woods.

find morels in spots where I'd already looked, I start thinking of Evans as the "Mushroom Whisperer."

We begin to find a few small morels, but the footprints of commercial pickers are everywhere. Evans urges us to follow him upslope another quarter mile, then another quarter mile. "At some point we'll reach the spot where last week's pickers ran into snow that has since melted and receded. We should find some there."

Sure enough, toward the top of the slope the footprints end and we start finding newly sprouted morels. Not the mother lode we've been hoping for, but more than before. And then, just as the picking gets good, the burn starts to dwindle and turns into a green hilltop lush with vegetation. "It isn't unusual to have a fire peter out at high elevations, because many happen in September right about when the first high-elevation snows hit," Evans says with a shrug.

Having run out of burn, we head back to the truck. Evans scampers the whole way down the steep mountainside, stopping periodically to peer under fallen trees. In my mind I can hear him whispering to the ground, calling the morels to show themselves.

They didn't today, but the mysterious fungi just might hear him tomorrow.

For more information on morels, see "On the Trail of the Elusive Morel," March-April 2004, on the Montana Outdoors *website: fwp.mt.gov/mtoutdoors/.*

Join to get the inside scoop

The Missoula-based Western Montana Mycological Association (WMMA)'s lively Fungal Jungal website **(fungaljungal.org)**, maintained by Evans and fellow mycologist Tim Wheeler, is packed with information on morels and other mushrooms. Flooded by constant requests for free advice on mushrooms and collecting, Evans and Wheeler recently established several levels of WMMA membership that provide increasing amounts of information on finding morels and other mushrooms for increased fees. For instance, anyone can look at the website and find basic information. But a $150 annual membership provides access to WMMA's morel hunter chat line, where experts discuss current morelling activity, as well as three "morelling alert" e-mails or phone calls during the height of the season with tips on exactly where to go.

"Tim and I volunteer our time to the WMMA to help people appreciate this remarkable resource," Evans says. "We feel it's important to protect the public's health by providing mushroom identification, and we provide that service for free. But it's expensive to maintain our website, so we depend on the generosity of our members—especially those who attend WMMA events like the Memorial Day Morel Foray. We've never been skunked in 24 years. Tim and I know how to find morels, and the foray is a great place to learn from us." ■

reddish conifer needles litter the partially burned forest floor. This indicates that the fire was not too hot to burn needles off the higher branches but still hot enough to kill the tree, creating ideal conditions for morel growth the following spring and summer.

Seek out areas where moisture collects or creates damp conditions, such as along seeps and springs, next to creeks, on benches, under downed trees, at the base of standing and uprooted trees, and in depressions. If your shoes are getting damp, morels may be nearby.

Look for the mycelium—resembling white spider webs or strands of ash—that occasionally rise to the surface under downed trees. Morels may be close at hand. The presence of fairy cups, another type of mushroom, is a good sign and indicates that conditions are ripe for morels.

Mycelium strands

Morel stumps, or rings, indicate previous pickers. If the cuts look old, search nearby for new morels that may have sprouted since, especially if rain fell during the previous few days. If the cuts are new, the general area is good for morels and may hold some in out-of-the way spots like behind the branches of large downed trees.

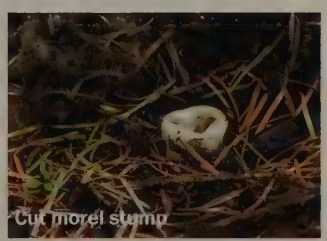
IF YOU FIND ONE

Crouch down, cut it off at the base, then slowly look for other morels growing nearby. Set your bag down and walk around, bent at the waist, looking at the site from different angles. Continue searching while moving laterally along the mountainside, maintaining the same elevation.

Once you stop finding new morels, look for areas that contain the same soil and moisture characteristics as where you were finding them before.

IF YOU DON'T

If morels aren't sprouting where you think they should be (a fire site from the previous year, in May through early July, during moist and warm conditions), change to a different elevation (go down in April through May or up in June) or mountain "aspect" (the direction the hillside is facing) until you find the right combination of soil temperature, burn mosaic, and moisture.


Cut morel stump

Burn morels

TYPES OF MORELS

Mushroom experts group morels into three categories: 1) "burn," or "fire," morels (of which there are two main types: the smaller "black," which sprouts mainly before mid-June, and the larger "gray," which sprouts mainly after mid-June), found at fire sites; 2) "river," or "blond," morels, found in riparian areas; and 3) "natural" morels, found on lawns, in parks, or in any other areas that aren't streamside or on fire sites.

HEALTH HAZARDS

When thoroughly cooked, morels are safe for most people to consume. However, some people are allergic, so if you've never eaten one, consider trying a small cooked sample first to test for a reaction. Avoid picking old, dried-out morels. They taste terrible and can cause stomachaches. Never eat the three inedible morel lookalikes. The snowbank false morel and beefsteak morel look like brain lobes and are reddish or orangish. If unsure, cut the mushroom in half. "If not hollow, don't swallow," is one rule of thumb. The dangerous early false morel has a head that hangs over the stem, like a skirt or umbrella, while the head of a true morel merges smoothly with the stem. Regarding the head and the stem: "If not attached, throw in the trash."

A hollow true morel

ASKING AND PICKING ETIQUETTE

Don't be surprised or insulted if a morel picker you know is reluctant to tell you exactly where and when to go. It can take pickers years of exploring to find productive sites, so it's not fair to expect them to divulge hotspots to just anyone.

When picking, try to give others in the area plenty of room by staying out of sight. Watch what direction others are moving and try not to jump ahead. At the same time, keep in mind that national forests are public lands, and no one can "claim" a morelling site.

If you run into others in the woods, don't be shy about asking for information about where they are finding morels, such as the elevation, ground types, and slope aspect. Mushroom pickers can be secretive, but most are willing to share at least a little information with beginners. ■

A good start

The People Behind the Place

Montana's new Outdoor Hall of Fame celebrates the broad cross-section of individuals who've made—and continue to make—this wild and scenic state what it is today. By Tom Dickson

If you recognize the name Granville Stuart, it's likely from a school history class. Pioneer, gold prospector, businessman, civic leader, vigilante, author, cattleman, and diplomat, Stuart lived a life that fully embodied the early history of Montana Territory and the state of Montana.

Yet few Montanans know that Stuart was also a visionary conservationist, among the territory's first leaders to call for restrictions on fish and game harvest. "If the legislature does not enact some laws in regard to game and fish," he wrote in the late 19th century, "there will not be in a few years so much as a minnow or deer left alive in all the territory." Stuart also founded the Helena Rifle Club, Montana's first local sportsmen's group that advocated for a state conservation code.

More than a century later, Chris Marchion is carrying on the good work begun by Stuart. Over the past three decades, the Anaconda resident has served as president of both the Anaconda Sportsmen Club and Montana Wildlife Federation (the latter for three terms), advocated on behalf of bighorn sheep conservation, championed protection of roadless forest lands, and helped ban game farm hunting.

Between the times of Stuart and Marchion, thousands of Montanans—ranchers, laborers, nurses, attorneys, teachers, legislators, and more—have volunteered time and energy to conserve the state's wild rivers, wild lands, and wildlife populations. Yet, in a state renowned for its unspoiled outdoors, few of the people who helped keep it that way have received official recognition. That's begun to change.

In December 2014, an inaugural class of 12 individuals—living and deceased—were inducted into the newly formed Montana Outdoor Hall of Fame at a ceremony in Helena. Longtime conservationist and

PARADISE SAVED "To the Victor Belong the Spoils," by Charles M. Russell, 1901. Russell was inducted into the new Montana Outdoor Hall of Fame for painting images of the Montana frontier that inspired future conservationists to restore what had been lost and to protect what remained.

author Jim Posewitz of Helena, who spearheaded the effort to establish a hall of fame, says he modeled it after one in Wyoming. Posewitz enlisted the support of Montana Historical Society director Bruce Whittenberg to verify the histories and significance of the nominees. He also recruited representatives from Montana Fish, Wildlife & Parks, Montana's Outdoor Legacy Foundation, the Montana Wildlife Federation, the Montana Wilderness Association, and Montana Trout Unlimited to select the first class of inductees.

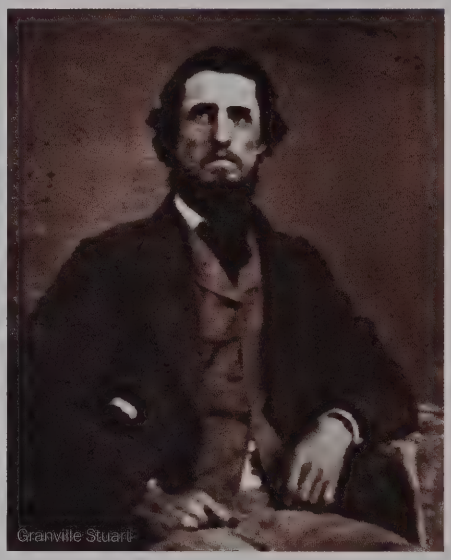
Posewitz points out that the history of Montana usually focuses on the fur trade, mining, logging, farming, ranching, and other development that has sustained people economically. "But Montana is also our free-running rivers filled with trout, our wilderness, our foothills and prairies teeming with elk and antelope," he says. "All of that has been restored, nurtured, and conserved by individuals who value those amenities and want to embed a conservation ethic into our culture. By collecting their stories and institutionalizing them in the hall of fame, they become another part of how we talk about Montana's great history."

Thomas Baumeister, chief of the FWP Education Bureau and a member of the nominating committee, says the restoration, protection, and stewardship of Montana's outdoors is a job far too big for just one or two interest groups. "Conservation is a big tent, one that invites and needs a diversity of people interested in the natural world," he says. "Making Montana the state it is today has required the participation of wilderness advocates, hunters, land trust donors, landowners, anglers, wildlife watchers, you name it. All of them care about the wild and unspoiled nature of this state and have committed themselves to helping keep it that way. It's that combination of diversity and personal commitment that the new hall of fame is celebrating."

Future Montana Outdoor Hall of Fame nominations will be open to the public (see bottom of page 27). A review committee comprising Montana conservationists from across the state will make final selections for a new class of inductees every two years.

Tom Dickson is editor of Montana Outdoors.

2014 Montana Outdoor Hall of Fame Inductees


Granville Stuart

Granville Stuart
1834-1918

Later dubbed "Mr. Montana" for his unparalleled contributions to the early development of the territory and then the state, Granville Stuart witnessed firsthand the near extirpation of many big game populations in the latter half of the 19th century. While in the Judith Basin, he observed thousands "of buffalo darken[ing] the rolling plains. There were deer, antelope, elk, wolves, and coyotes on every hill and in every ravine and thicket." Just three years later, he wrote, "there was not one buffalo remaining on the range and the antelope, elk, and deer were indeed scarce." Granville and his brother, James, successfully sought legislation in 1864 to protect trout populations from seining and to restrict harvest to hook and line only. In 1872 the brothers helped convince the Territorial Legislature to restrict, for the first time, hunting seasons on bison, moose, elk, deer, mountain goats, bighorn sheep, and pronghorn to protect the populations.

Theodore Roosevelt
1858-1919

President Theodore Roosevelt's conservation ethic was forged during hunting trips in Montana and other western states. There he saw how commercial harvest decimated bison, bighorn sheep, and other big game herds. As president, Roosevelt called for restoring big game populations and setting aside public land to be held in the public trust. Among his many conservation policies and achievements: preserving 230 million acres nationwide as wildlife refuges, national monuments, national parks, federal bird preserves, and national game ranges, and establishing another 150 million acres as forest reserves. "Our aim," he announced to the nation, "is to preserve our natural resources for the public as a whole, for the average man and the average woman who make up the body of the American people."

Theodore Roosevelt

PHOTOS PROVIDED BY THE MONTANA OUTDOOR HALL OF FAME

Charles M. Russell
1864-1926

Charlie Russell moved to Montana from Missouri in 1880 when he was 16 and lived here the rest of his life. He painted the Wild West just as it was slipping away, capturing fleeting moments capable of inspiring others to restore what had been lost. The artist lamented how the West had been neutered by railroads, telegraph lines, and pioneers. "Civilization is nature's worst enemy," Russell wrote in 1919. "All wild things vanish when she comes." His paintings of Indians, wildlife, and the Corps of Discovery created a tableau of what Montana had been like before European settlement, giving conservationists a vision of what some of the state might one day become again.

"Guard, protect and cherish your land, for there is no afterlife for a place that started out as Heaven."

—Charles M. Russell

Lee Metcalf
1911-1978

It's no wonder the wilderness area in southwestern Montana is named after U.S. Senator Lee Metcalf. He led the fight—and it was indeed a struggle—to create and pass the Wilderness Act of 1964. Metcalf was born in Stevensville in 1911 and earned his law degree from the University of Montana. For a quarter century (1953 to 1978) he represented Montana and environmental issues in Washington, D.C., as a congressman and then a U.S. senator. In addition to his advocacy for wilderness, Metcalf sponsored, cosponsored, or wrote conservation legislation for the Clean Air Act of 1963, the Land and Water Conservation Fund Act of 1964, the Wild and Scenic Rivers Act of 1968, and the Clean Air Act of 1972.

Senator Lee Metcalf

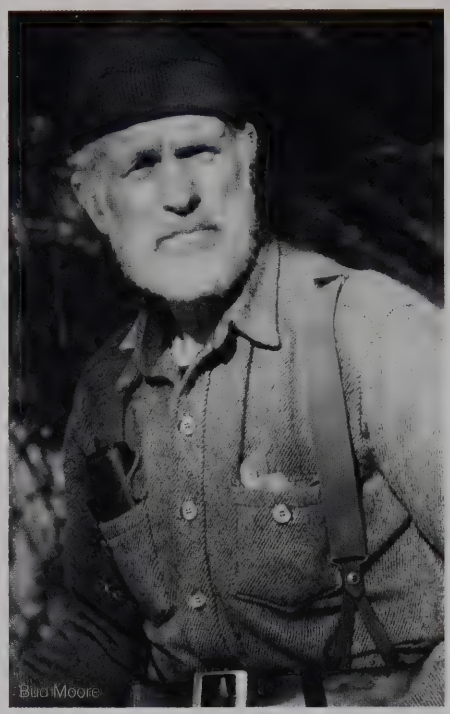
Don Aldrich
1912-1990

Born in Deer Lodge in 1912, Aldrich spent most of his life as a citizen advocate for conservation. He worked 33 years for the Montana Power Company, often returning home for a quick dinner before heading back out for his second "shift" to lead various conservation groups. He turned the Missoula-based Western Montana Fish and Game Association from a "good old boy" club, as he called it, to a formidable organization that advocated conservation-based wildlife management. He served for more than three decades as treasurer, vice president, president, or executive secretary of the Montana Wildlife Federation. He also established a statewide telephone network that became today's Montana Environmental Information Center. Aldrich took part in nearly every major Montana stream, wildlife, mining, wilderness, and energy issue from the 1950s until his death in 1990. He received several national conservation awards—including the prestigious American Motors Conservation Award in 1966—for his vast knowledge and remarkable ability to get things done.

Don Aldrich

Bud Moore
1917-2010

Bud Moore was a trapper, logger, hunter, and horse packer. But above all, the Montana native was an ecologist and naturalist, a man who fell in love with wilderness at an early age and spent his life working to conserve it. Moore was born in 1917 and grew up along the Bitterroot Mountains. At age 17 he convinced the U.S Forest Service to hire him. During his 40-year career with the agency, he led efforts to let fire play its historical ecological role in national forests. He helped found the agency's current wilderness fire management policy and led, in the 1960s and '70s, efforts to use wilderness fire in ecosystem management.



In his work on national forests and his 80-acre property in the Swan Valley—where he resided in a hand-built cabin with his wife, Janet—Moore adhered to the principle of whole-land, or ecosystem, management, what he called, paraphrasing Aldo Leopold, "keeping all the parts." Moore and his wife founded the Montana Trappers Association and helped establish the state's trapper education program with the goal of improving trappers' ethics and keeping alive the heritage of backcountry trapping.

> "As everything in an ecosystem is 'hitched' to everything else, we are ... linked to each other and to the land with similar invisible bonds."
>
> —Bud Moore

★ Thurman Trosper
1918-2007

A member of the Confederated Salish and Kootenai Tribes, Thurman Trosper was born in 1918 on the Flathead Indian Reservation. In addition to a career with the U.S. Forest Service—where he became one of the first American Indians to hold a management position—and other federal agencies, he became a leader in The Wilderness Society, including three years as the organization's president. Trosper fought a proposed open-pit coal mine in British Columbia that threatened water quality in Flathead Lake. He pushed for designation of the Great Bear Wilderness, which Congress authorized in 1978. Trosper's crowning achievement was in his own backyard. For eight years, he organized allies, led field trips, and was eventually successful in helping convince the Flathead Reservation Tribal Council to oppose clear-cutting the Mission Mountains behind his home and establish the nation's first tribal wilderness area, the Mission Mountains Tribal Wilderness.

★ Doris Milner
1920-2007

After Doris Milner moved to Hamilton in 1951 at age 31, she spent the rest of her life working to preserve wilderness across western Montana. Her advocacy began in the early 1960s, when she spotted a bulldozer near a favorite camping spot along the upper Selway River,

just over the Idaho border. She soon cofounded a conservation group to oppose permanent development of a pristine 100-mile stretch of the wild river. "All I knew was I was mad—and I was going to do something about it," she told a journalist in 2004. And she did, eventually helping secure designation of the Frank Church River of No Return Wilderness. Milner, who died in 2007 at age 87, was a longtime member, and president for three years, of the Montana Wilderness Association. She was named one of the nation's top ten conservationists in 1978 by American Motors Corporation. "Her perseverance was epic," says friend and writer Dale Burk, of Stevensville, "but she also based her stance on a scientific analysis of the law of nature and the law of the land. That set her apart from many other activists."

★ Cecil Garland
1925-2014

Anyone who has hiked, hunted, or fished in the Scapegoat Wilderness has Cecil Garland to thank. After moving to Lincoln in 1955 from his home state of North Carolina, Garland fell in love with the wilderness of the upper Blackfoot River watershed. Concerned that the wild and scenic forests would soon be ruined, he helped form the Lincoln Back Country Protective Association and gained support to end logging in the area, despite community protests and even boycotts of his hardware store. The Scapegoat was desig-

PHOTOS PROVIDED BY MONTANA OUTDOOR HALL OF FAME

nated by Congress as a wilderness in 1972. It was the first area to enter the wilderness system by citizen initiative rather than by nomination from the federal agencies jointly responsible for the lands.

Garland later served as both vice president and president of the Montana Wilderness Association.

Gerry Jennings
1940-

A mother of four and previously a university nursing instructor, Gerry Jennings has been a fixture in Montana's wilderness advocacy community since 1993. The 74-year-old Great Falls resident has twice served as president of her local chapter of the Montana Wilderness Association and was president of the MWA State Council from 2002 to 2006. Jennings says that even though Montana offers abundant recreational opportunities, wildlife, and scenery, citizen involvement is essential for keeping it that way. "The wildlands, the skiing, and the biking will be there for me and my husband for the rest of our lifetimes," she says. "But I want the same activities, solitude, and protected lands to be available for our kids and grandkids, and the rest of their generation, as they get older."

Ron Marcoux
1942-

In the early 1970s, FWP biologists conducted studies showing that stocking trout on top of wild trout populations resulted in fewer fish overall. Ron Marcoux, FWP regional fisheries manager in Bozeman, and other agency officials stood behind the research and helped champion what, after initial and widespread criticism, became a statewide policy not to stock rivers. The policy has since created some of the nation's top blue-ribbon trout fisheries. During the 1980s, while he was FWP associate director and deputy director, Marcoux represented the agency in advocating for the Stream Access Law of 1985, the Block Management Program, and the Habitat Montana Program. After leaving FWP, Marcoux worked for 15 years in leadership positions at the Rocky Mountain Elk Foundation, where he developed the organization's land acquisition, conservation easement, and land-donation programs.

Chris Marchion
1952-

If anyone embodies the Montana citizen conservationist, it's Chris Marchion. Every year for the past three decades, Marchion has been secretary, vice president, or president of the Anaconda Sportsmen Club. For 14 years he was on the executive board of the Montana Wildlife Federation, and for 20 years he served on a citizen's advisory committee that reviewed state and federal habitat projects on public lands. Among the 62-year-old Anaconda resident's most notable achievements: drafting and seeing to passage Montana's bighorn sheep auction bill, which has raised millions of dollars for wild sheep conservation and management; helping protect 35,000 acres of critical habitat that adjoin the Mount Haggin Wildlife Management Area; and leading the fight to ban, through a Montana ballot initiative, the shooting of captive wildlife. He has also helped build structures at fishing access sites, planted willows along stream banks, and assisted with controlled burns to reinvigorate forage on elk winter range.

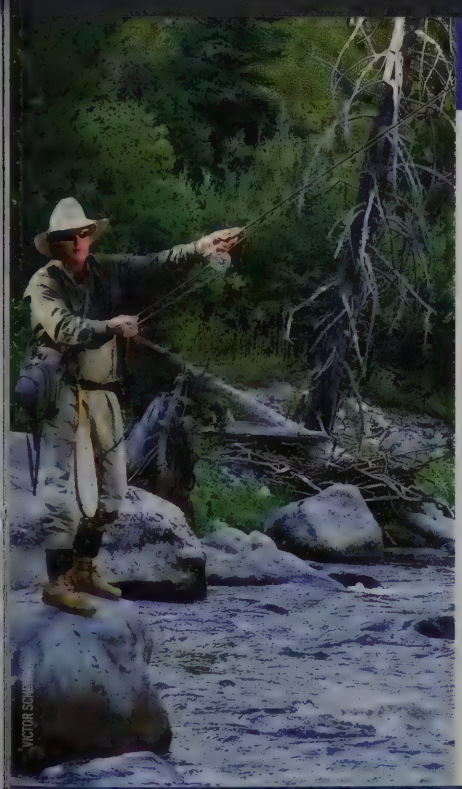
MONTANA OUTDOOR HALL OF FAME

For more information on the Montana Outdoor Hall of Fame and criteria to nominate someone, visit **mtoutdoorlegacy.org**.

MONTANA OUTDOOR HALL OF FAME LOGO AND GRAPHICS DESIGNED BY LUKE DURAN

Back Talk

Whether wagging, waving, thrashing, flaring, rattling, slapping, or bobbing, animal tails have a lot to say. **By Ben Long**



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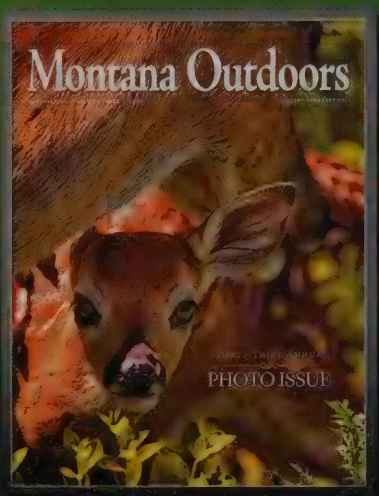

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the photo issue.
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BITE ME! Weasels turn white in winter, perfect for blending into their snowy environment. Yet they retain a black spot on the tail tip. Scientists believe the conspicuous mark distracts attacking predators such as hawks, which strike at the weasel's highly visible black spot instead of its body.

CINDY GOEDDEL

Our family once owned a Lab mix named Emma who defended our yard against four-legged invaders. When deer raided the apple tree, she scattered the does and fawns with a woof and a charge. This truce held until one Thanksgiving when a hormonally charged buck would not cede ground. Emma charged, hackles up and tail erect as a ship's mast. The message of her body language was clear: *Back off! This is my turf.*

The buck responded with almost identical posturing. His rut-fattened neck bristled and his white flag stood up straight. His message: *You and whose army?*

Emma literally turned tail. Her once proudly erect tail was clamped between her legs as she whimpered for cover. The buck stamped his hooves, then made a stage exit.

Pet owners know that animals are experts at body language. The wag of a dog's tail or the swish of a cat's delivers a message faster than a teen with a smartphone: *So happy to see you!* or *Don't push your luck!*

Wild animals also depend on body language—to survive, earn a meal, maintain social status, and more. Tails are wonderful ways to get those messages across. For instance, beavers slap their tail against the water surface to alert others of danger. Striped skunks raise and flare their tail, warning intruders that a putrid blast has their name on it. Bison have four different tail positions, each with a separate meaning, ranging from *All is calm* to *I'm about to charge you for coming too close.*

For a deeper glimpse into the world of the wild, pay attention to the tales told by tails.

Buzz off!

One Fourth of July, friends and I were exploring a coulee off the Milk River. We were approaching a patch of shade for a break when we heard it—the buzz of a prairie rattlesnake.

There's no mistaking that sound, which the human brain instantly recognizes as a warning. The snake continued to issue the terrifying announcement of its presence while slithering off from its shady resting spot into a rocky crevice.

The rattlesnake's rattle is an amazing adaptation. It lets intruders know the snake is present so the reptile doesn't get stepped on or have to expend precious venom while

defending itself. It also warns predators to stay away, or else. The message is so clear that American colonists put a rattlesnake on their flags during the Revolutionary War, warning the British crown: *Don't tread on me.*

How did this species evolve to possess such a noisy posterior? Other tail-wiggling snakes may hold a clue.

While rattles are rare among snakes, tail shaking is common. Some species wave their tails as a visual lure to attract small prey—say a curious mouse—into striking range.

Lacking venomous fangs for defense, Montana's bull snake rapidly vibrates its tail in tall grass to create a rattling sound similar to the rattlesnake's, fooling predators into thinking that it's far more dangerous than it really is.

Another Montana snake, the rubber boa, "speaks" with its tail. When threatened, the rubber boa buries its head in its coils and raise its tail in the air, as if to say: *This is my head; strike here.* Scientists believe this tactic is meant to confuse predators. A coyote or badger that strikes at the tail will do little damage and the snake can escape.

Eons ago, prehistoric ancestors of rattlesnakes developed an elongated terminal vertebra in the spine that enhanced their tail shake. Deposits of a protein called keratin

DON'T BOTHER Biologists and hunters have long assumed that a whitetail's flag signaled to other deer that danger was afoot. One study came to a different conclusion: that the white flag tells an approaching predator it has been spotted and not to give chase—saving both the deer and its adversary from wasting their energy.

(what a fingernail is made of) resulted in a noisemaker. Generation by generation, the tail evolved into increasingly sophisticated and nosier rattles.

Ironically, in some places where people try to eradicate rattlesnakes, the reptiles rattle much less frequently. Either the snakes have learned that making noise attracts trouble, or those too quick to rattle were located, killed, and removed from the gene pool.

For some snakes, the rattle that was once a survival asset can be a liability.

Game over

On a cool October morning, when any rattlesnakes were deep in their dens, I crawled on my belly across a mudstone escarpment of the Charles M. Russell National Wildlife Refuge. On the other side, I knew, was a bedded herd of pronghorn. With my rifle tucked in my arms, I wiggled over the rim. This was getting exciting.

I peeked over, only to see the herd up and on high alert—the hair on their white butts flared like powder puffs. Without glancing back, they vanished in a trail of dust. Any pronghorn hunter knows that these prairie speedsters use their tails to signal danger to each other. But is there more to it than that? Probably.

White-tailed deer have a similar trick. When spooked, they flare and wave their famous flags as they weave and bob through the woods or across a field.

At first glance, that might seem counterproductive. Isn't it dangerous for a prey animal to bring attention to itself when it spies a predator? Biologists have long speculated about this seeming paradox.

Some scientists believe that the white tail is a "flash," meant to surprise a predator and throw it off balance, like the explosive sound made by a flushing pheasant; others maintain that it signifies danger, warning nearby deer. Or maybe the white tail is a "cohesive signal," a tool to make it easier for fawns to follow does into cover or, in the case of pronghorns, to help a herd stay together.

In the early 1980s Keith Bildstein, a biologist then working in South Carolina, tried to get to the bottom of this mystery. He approached hundreds of deer on foot and carefully documented their responses. He estimated the age of each deer and noted whether it was alone or in groups, and what kind of habitat it was using.

What Bildstein found was that, while running away, deer tended to wave their rump flag at him and not at other nearby deer. What's more, they flagged as often while alone as when in groups.

Bildstein concluded that flagging is a "detection signal." That is, the deer flags to tell the predator it has been spotted and that pursuit will be fruitless: *I see you. You're busted. Game over. Don't waste my energy and I won't waste yours.*

As a hunter who has been "busted" by hundreds of white-tailed deer over the years, this hypothesis rings true. I suppose only the deer know for sure.

As a hunter who has been "busted" by hundreds of white-tailed deer over the years, this "detection signal" hypothesis rings true to me. I suppose only the deer know for sure.

Distracting tails

Curiously, some species with excellent natural camouflage that allows them to disappear into their surroundings also have highly visible tails.

Two of Montana's three weasel species—the long-tailed and the short-tailed—possess conspicuous tails. Both weasels turn from brown to white in winter, perfect for blending into the snowy environment, yet retain their black tail tip. Scientists believe the black spot distracts predators in winter. Roger Powell came up with a clever experiment to prove it.

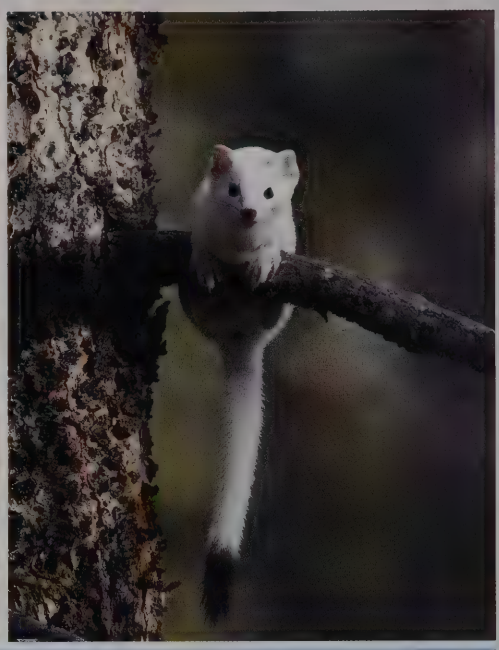
Today a professor emeritus at North Carolina State University, Powell argued that when a hawk takes after a weasel, it will likely become distracted by the black spot. While aiming its talons on that spot, it's more likely to miss the weasel's more vulnerable body.

As a test, Powell created decoys that represented weasels with and without black

Longtime Montana Outdoors *contributor Ben Long lives in Kalispell.*

TAIL TALK When threatened or disturbed, some snake species "speak" with their tails. The rubber boa (left) buries its head in its coils and waves its tail as a diversion that says, *This is my head; strike here.* A prairie rattlesnake, on the other hand, uses its tail to send a warning to would-be predators: *Stay away or suffer the consequences.*

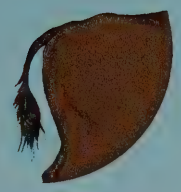
LEFT TO RIGHT: JOHN ERIKSSON/IMAGES ON THE WILDSIDE; MERLE ANN LOMAN; MICHAEL H. FRANCIS



BABBLING BACKSIDES Wild animals depend on body language to survive, earn a meal, maintain social status, and more. Tails are wonderful ways to get those messages across, in as many different "languages" as there are wildlife species. Some examples (clockwise from above left): A wild turkey tom fans his tail as an advertisement to potential mates that he wants to breed; a striped skunk flares its tail before spraying, allowing intruders a few minutes to reconsider and head elsewhere; in winter, weasels turn entirely white but for their tail tip, which may act to divert would-be attackers; the flat, broad tail of a beaver, when slapped on the water surface, lets others in the colony know that danger is near; when agitated, pronghorn flare their rumps, perhaps as a warning to others in the herd but also to tell approaching predators they've been spotted; the white tail of the jackrabbit and cottontail rabbit work as "deflection marks," capturing the attention of pursuers just long enough for the prey to make its getaway.

CLOCKWISE FROM TOP LEFT: STEVEN ACRE; DANNY BROWN; CINDY COFFODIL; CINDY COFFODIL; JUDY WANTULOK; JUDY WANTULOK; FRANCIS C. FRANCIS

TALKATIVE TAIL Officials at Yellowstone National Park urge visitors to notice subtle differences in a bison's tail position to ensure they are not bothering the dangerous animals. The tail position in this photograph indicates that the bison is likely agitated and people should move away.



Position 1: Bison is at rest and not agitated.

Position 2: Bison is interested or curious.

Position 3: Bison is agitated. Used to warn other bison or people to move off.

Position 4: Bison is about to charge, such as when a cow is defending her calf.

NOTE: Positions 3 and 4 are also similar to what bison display when about to defecate—which could be considered a warning of another kind.

tail tips. Then he used trained redtail hawks to chase the decoys. He found that the hawks had a much harder time capturing the decoys that had black tail tips than the ones that were pure white. Also, the hawks chasing black-tipped decoys appeared confused at the last moment of the strike, as if they seemed to realize too late that there was a lot more weasel in front of the black spot than behind it.

Powell also had an answer for why least weasels (another species native to Montana), don't have tails with black tips. The animals are simply too small for the deception to work. The black spot has to be far enough from the rest of the weasel so a hawk's talon doesn't snag the body. Because the least weasel is just 7 inches long (about half the length of the other two species), a black tail tip would be too close to its haunches to protect the animal from harm.

Whether the tail spot is black or white, this phenomenon is called a "deflection mark." Its message is a sly sleight of tail: *Hey, lookie over there!*

It seems logical that Montana's white-tailed and black-tailed jackrabbits may have developed their tail patterns for similar purposes: to confuse the golden eagles that descend on them from the prairie sky.

The cottontail rabbit's tail seems to work in much the same way. All three of Montana's cottontail species—eastern, mountain, and desert—are mottled brown except for their white, telltale tail. Whether hiding on the forest floor, on a high desert rimrock, or in prairie grass, these bunnies can disappear simply by holding still.

> Of course, tails may serve more than one purpose, just like our hands can wave hello to a friend one moment and ask a motorist to stop the next.

But when they bolt, it's a different story. They zigzag, flashing that conspicuous cotton ball as they go. Biologists suspected that a pursuing hawk or coyote focuses on the tail, and when the rabbit makes a sharp turn, the predator is thrown off for a few seconds. That buys the bunny just enough time to escape.

To test this hypothesis, German biologist Dirk Semmann created a video game in which humans acting as predators chased rabbits in conditions that replicated natural pursuit. Some of the video rabbits were given white tails and some weren't. In that test, the rabbits with white tails were more likely to survive.

Of course, tails may serve more than one purpose, just like our hands can wave hello to a friend one moment and ask a motorist to stop the next. An animal's tail may at one time confuse predators, later provide a beacon for trailing young to follow, and in another season capture the attention of a potential mate.

Humans and apes are the only mammals lacking tails, though we do have what's known as a "vestigial tail"—the coccyx, or tailbone. Apparently, at one time an ancestor species of *Homo sapiens* had a tail, but over millions of years it shrunk to almost nothing.

Though I admire the clarity that comes from communicating with a tail—a fur flash or tail rattle—it lacks the power and precision that comes from a human's vocal chords, or the computer keyboard I'm using right now. Humans may lack a tail, but our complex language is one of the traits that make our species unique.

BISON PHOTO: JEREMIE HOLLMAN; ILLUSTRATIONS BY WES OLSON

A Great Place To Be a Bluebill

Researchers at Red Rock Lakes in southwestern Montana are trying to figure out why lesser scaup are faring so well at the remote national wildlife refuge but so poorly elsewhere in North America. **By Tom Dickson**

Populations of many North American prairie duck species such as mallards and teal have risen to record levels in recent years, owing mainly to abundant grass and water in the Prairie Pothole Region. But lesser scaup numbers have been dropping, and no one knows why. For the past decade, researchers at the Red Rock Lakes National Wildlife Refuge (NWR), about 30 miles west of West Yellowstone, have been trying to learn more about the ducks and provide answers.

Lesser scaup and the slightly larger greater scaup—two nearly identical species, both called "bluebills" by many waterfowl hunters—are diving ducks. Rather than feed in shallows like mallards and other dabbling ducks, divers hang out in deeper water, swimming to the bottom to fill their bills with aquatic vegetation, seeds, insects, and crustaceans before resurfacing to eat. The lesser, comprising about 90 percent of the continent-wide bluebill population, is the most numerous and widespread of all diving duck species, which include canvasbacks, ringnecks, and redheads.

Numbers of both scaup species have declined steadily since their peak in the mid-1980s. Today's combined population of 4 million is far below the goal of 6.3 million set by the U.S. Fish & Wildlife Service (USFWS).

Lesser scaup breed mainly near lakes and ponds in Canadian forests and on Alaskan tundra. Some studies are focusing on western Canada, which has the greatest amount of breeding habitat and where population declines are greatest. One theory is that the decrease in scaup numbers could be caused by habitat loss from intensive logging, mineral extraction, and agriculture.

Another theory: The birds' contaminated diet may be harming their eggs. "Many lesser scaup winter in coastal areas like the Gulf of Mexico and San Francisco Bay," says Jeff Warren, research team leader for the USFWS study at Red Rock Lakes. "PCBs and other contaminants in the aquatic foods that hens eat could be damaging egg development and reducing nesting success."

Researchers are also looking at places where lesser scaup are doing well—like Lower Red Rock Lake, a wetlands complex with one of the highest densities of breeding lesser scaup in North America. This high-altitude wetlands-prairie-sagebrush complex is home to nearly 300 bulrush islands and vast tracts of sedge, making it ideal for scaup nesting. Warren and his crew study different demographic factors such as adult survival, nesting success, and duckling survival to see if any influence the overall population. "We want to see if something like nesting success is a factor in population declines, and then whether there's anything we can do about the factors that may be at play," he says.

BLUE BILL, AMBER EYES Lesser scaup are the most numerous of the diving duck species. Most lesser scaup breed near lakes in Alaska and western Canada, where numbers are dropping. Scientist are studying a thriving population at Red Rock Lakes National Wildlife Refuge for clues that might aid scaup elsewhere.

At the refuge each August and September, when ducks molt (lose feathers so new ones can grow in) and are flightless, crews in canoes round up lesser scaup ducklings and hens into wire mesh traps. So far roughly 4,000 ducks have been captured, marked, weighed, and measured.

When marked scaup are re-sighted, re-captured, or harvested by hunters—or the birds' identification numbers are called in by observers—researchers use each duck's history to understand population trends and estimate harvest and seasonal survival.

Among Warren's findings so far:

- "One surprise has been that these scaup rely more on seeds and invertebrates eaten at the study site for egg production than expected," he says. "Lower Red Rock Lake is a more important prebreeding area

Tom Dickson is editor of Montana Outdoors.

for hens than we thought."

- Eggs laid at Red Rocks Lakes are largely contaminant free. "It could be that feeding here in this near-pristine environment cleans out a hen's system of any contaminants she picked up elsewhere," says Warren.
- Average clutch size (the number of ducklings produced by hens) is smaller than at other study sites in North America. "We don't know why, but it may be that this site has the shortest and most variable growing season of all the sites studied, which included Alaska and the northern edge of the boreal forest in Canada," says Warren.
- The nest survival rate (percent of nests that survive to produce ducklings) is higher at Red Rock than almost anywhere in North America. "The abundant islands and vast tracts of sedges where hens can hide their nests is probably why," says Warren. "It shows the value of protecting these large, intact landscapes."

Warren and other researchers have recently begun studying how hunting affects the Red Rock population. They hope to learn if hunting harvest there is "additive"—the ducks would have survived if not killed by hunters—or "compensatory"—ducks shot by hunters likely would have died anyway from disease, predation, or other natural causes.

"We're working with the USFWS Division of Migratory Bird Management so that what we learn can help them figure out the appropriate scaup hunting season limits and lengths for the future," Warren says.

SCAUP STUDY Clockwise from above: USFWS biologists and volunteers round up molting ducks; measuring a duckling's head and bill size; releasing young scaup back to the water.

CLOCKWISE, FROM LEFT: MAP BY LUKE DURAN/*MONTANA OUTDOORS*; FRED GREENSLADE / IMAGES ON THE WILDSIDE; MARILYN KIRCUS; JEFF WARREN; MARILYN KIRCUS

MADE IT Pronghorn easily pass under a fence on which the bottom two strands have been entwined. Simple solutions like this allow wildlife to reach water, fawning grounds, and winter range.

FINDING A WAY // THROUGH

Biologists and ranchers are devising innovative ways to help elk, deer, pronghorn, and other wildlife travel over, under, and through livestock fencing without harm. By Jack Ballard

Growing up on a ranch west of Three Forks, my two older brothers and I chafed every time we heard Dad announce the day's job was to "fix fence." Yet even back then I understood the value of fencing. Those miles of barbed wire surrounding the perimeter and intersecting the interior of our ranch were important livestock management tools, and they needed constant care. Fences kept cattle out of crops, delineated property boundaries, and prevented the co-mingling of our superior cows (in my father's opinion) with the substandard stock of our neighbors. Among his pet peeves were folks who failed to keep up their half of the fence line. Though no law in Montana requires ranchers to fence in their cattle on open range, a long-standing tradition assumes neighbors will do so and also split fencing chores 50:50.

That's because most landowners agree with the old saw that "good fences make good neighbors," meaning that it's far easier to get along if neither of you (nor your stock) trespasses on the other's property or privacy.

In recent years, the concept of "neighbor" in Montana has expanded beyond the woolgrower or cattleman down the road. It now includes the furred and feathered creatures that live among us and need to travel across the landscape to use various types of habitat during the year. For human neighbors who raise cattle and sheep, "good" fences are tight, maintained, and, most

Jack Ballard is a writer in Red Lodge.

VICTOR SCHRENDEL

of all, impermeable to livestock. But for wildlife neighbors, a "good" fence is usually one that allows them to get to the other side without injury.

How can fencing contain domestic ungulates like cattle while still allowing wild ungulates like pronghorn and elk calves to pass through unhindered? Biologists and ranchers are finding ways. By tailoring fence design and placement at key wildlife movement areas, they are reducing wildlife injuries while helping the landowner's bottom line. "Wildlife damage to a rancher's fence can be expensive and time consuming," says Ken McDonald, head of the Montana Fish, Wildlife & Parks Wildlife Division. "Many wildlife-friendly designs out there are easy to put into place and can help reduce fence repair costs."

> "Fences can be major impediments to those critical migrations."

SNARED, SNAGGED, AND BLOCKED

The vast majority of fencing across Montana does no harm to wildlife. But in some areas, fences pose physical hazards and migration blockages. Wildlife can get their horns or antlers caught in loose barbed wire. In residential areas, iron fences with spikes or pickets can impale leaping deer or elk that misjudge the height. The biggest problem is when the legs of deer and elk become entangled in the top one or two strands of a barbed-wire fence while the animal tries to jump over, causing it to die of trauma, starvation, or dehydration. Fawns and calves are the most vulnerable, but even adult deer and elk get caught in fences on steep slopes or when running from predators or racing across roads. Even if the ensnared animal manages to escape, barbs can tear ligaments or cause infection that lessens its chance of surviving.

Fences can also force animals to expend precious energy in winter when attempting to find food and shelter. Jumping a fence or two is no big deal. But if wildlife must migrate dozens or even hundreds of miles, as is the case with some pronghorn and elk herds, they could face a gauntlet of fences, each one sapping strength and fat reserves.

What's more, fences can separate a mother from her young, or completely cut wildlife off from forage or water or reaching core habitat such as that used for fawning or winter range. "Most big game animals need to move throughout the year to different seasonal habitats to find better feeding, breeding, and rearing conditions," says Joel Berger, the John J. Craighead chair of wildlife biology at the University of Montana and a senior scientist at the Wildlife Conservation Society. "Fences can be major impediments to those critical migrations."

One example is in southern Canada and north-central Montana, where for thousands of years pronghorn have traveled south 100 miles or more in early winter. Their destination: the windswept bluffs of the Missouri River Breaks, where they find exposed grass to eat. Highways, railroad crossings, canals, and rivers slow their progress, but the biggest impediments are fences. "We've known for a long time that barriers hamper antelope migrations," says Drew Henry, FWP wildlife biologist in Glasgow. "During that severe winter of 2010-11, we saw several places where they were stacking up along fence lines. Antelope may spend days walking back and forth trying to find a way through. During an epic winter like that one, additional days can be critical to their survival."

Some fences even harm birds. Swans, geese, and ducks collide with fences that cross streams, while raptors—especially low-flying species such as the northern harrier—can become tangled in barbed wire or break a wing when chasing prey. Sage-grouse also collide with fences, usually while flying to and from breeding leks during spring in the dim light of early morning.

UNDER BUT RARELY OVER

The most impermeable fencing is what ranchers call sheep fence or woven-wire—constructed of roughly 6-by-6-inch squares of thick wire with one to three strands of barbed wire on the top. Though this type of fencing effectively contains sheep, which can wiggle through regular barbed-wire fence, it blocks pronghorn and other wildlife trying to move past.

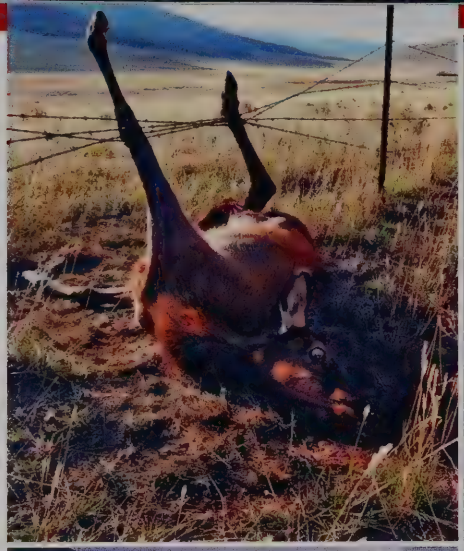
Most adult deer and elk will easily leap over sheep fence. But pronghorn, which evolved in prairie environments with no obstacles to jump, rarely make the leap. "Fences can trap antelope on roads, making them susceptible to vehicle collisions, or slow them down to where coyotes or wolves, which ordinarily aren't nearly fast enough, can actually overtake them," says Julie Cunningham, FWP wildlife biologist in Bozeman.

In addition to pronghorn, sheep wire impedes the movement of young moose, deer, elk, and black bears.

In the mid-2000s, researchers at the University of Utah documented wildlife

DAWN Y. WILSON

The researchers also found hundreds of additional dead animals near but not tangled in the fencing, usually the woven-wire type. Almost all were fawns lying in a curled position, most likely separated from their mothers when they were unable to jump over the fence and follow.



GRIM FATE Most fencing in Montana serves its primary function—delineating property and managing livestock movement—without harm to wildlife. But in some cases, fences trap, entangle, and severely injure wildlife as it migrates across landscapes. Clockwise from top left: Though two hunters were able to free this entangled calf, other elk and deer are not so fortunate; sage-grouse can strike fence wires while flying to and from breeding leks in pre-dawn darkness; deer and other wildlife caught in fences usually die of trauma, dehydration, or starvation; pronghorn are especially vulnerable because they haven't evolved to leap fences; even flying waterfowl like this trumpeter swan can be killed by fences stretched across streams where the birds fly low.

mortality along 600 miles of fence in Utah and Colorado rangelands. By repeatedly driving and walking fence lines over two seasons, they found an average of one dead deer, pronghorn, or elk per year tangled in barbed wire for every 2.5 miles of fence. Most of the animals had been caught in the top one or two wires while trying to jump over. The scientists found that 70 percent of the mortalities were on fences higher than 40 inches, and that the vast majority of casualties were juvenile animals.

The most lethal fence type? Woven-wire topped with a single strand of barbed wire.

The Utah researchers also found hundreds of additional dead animals near but not tangled in the fencing, usually the woven-wire type. Almost all were fawns lying in a curled position, most likely separated from their mothers when they were unable to jump over the fence and follow.

FINDING SOLUTIONS

Over the past several years, wildlife biologists with FWP and the Montana Department of Transportation (MDT) have been working with landowners across Montana to find ways to modify fences to reduce hazards to wildlife while still managing livestock movement. Landowners are encouraged to focus on high-traffic areas where problems are most likely. "Trails and seasonal routes indicate where and when fencing adjustments might be needed most," says Joe Weigand, an MDT wildlife biologist who previously worked on wildlife-friendly fencing solutions for FWP.

Henry, the FWP biologist in Glasgow, says he identified a bottleneck near Nashua where pronghorn are forced to cross a highway, several fences, and an active railroad. Easing some of the animals' stress and difficulty "was as easy as talking to the landowner to get his permission, rounding up some local guys, and pulling out an unused fence," he says.

When it comes to modifying existing fence at critical wildlife routes, landowners have many options (details and diagrams are shown in FWP's booklet *A Landowner's Guide to Wildlife-Friendly Fences*; see editor's note on page 39 on how to obtain a free copy), including:

- **Keep gates temporarily open.** Along key migration areas intersecting with sheep fence, the addition of a new gate—or simply having an existing gate—that can be opened in winter may provide all the passage that's needed for migrating pronghorn. "Many ranchers I know are receptive to leaving gates open when they pull cattle or other livestock from the range," says Henry.
- **Swap out the top and bottom barbed wires with smooth wire.** "This can greatly reduce cases of wildlife entanglement," says Weigand. "Covering those two wires with

> Landowners, communities, and homeowners need fences to keep elk from ravaging haystacks, wolves and other large carnivores from preying on livestock, bears from raiding garbage bins and chicken coops, and urban deer from damaging gardens.

CLOCKWISE FROM TOP LEFT: SETH WHEELER; JEREMY ROBERTS; LARRY DEARS; DIANA LEWASSEUR; MARK GOCKE, WY GAME & FISH DEPT.; MONA DOEBLER

PVC pipe also works well."

- **Raise the bottom wire to 18 inches above the ground.** This allows adult and juvenile pronghorn, deer fawns, and elk calves to slip underneath.
- **Lower the top wire to around 40 inches.** This makes it easier for adult deer and elk to jump over.
- **Create lay-down portions of fence.** These can be laid flat on the ground during times of migration. "Most of the designs allow just one person working alone to drop or raise the fence segment," Weigand says. In addition to allowing free passage of elk, lay-down fencing reduces the costs and labor required to repair fences that are damaged by migrating wildlife.
- **Tighten any loose top strands of wire.** Loose wire makes it more likely that the legs of jumping animals will get caught or the antlers of a buck or bull will become tangled.
- **Temporarily lower top wires and raise bottom wires.** Use staple locks or PVC pipe to gather several wires together to create larger openings.
- **To reduce bird fatalities, place fence flags or markers on wires to make them more visible.** Studies in Montana, Idaho, and Wyoming have demonstrated that markers can reduce grouse collisions with fences by up to 80 percent.

ON THE OTHER HAND

Sometimes fences can actually benefit wildlife. MDT builds tall woven-wire fences along stretches of highway where crossing wildlife—always a danger to motorists as well as the animals—would be particularly hazardous, like on blind curves. "But where drivers can see farther down the road, it's better to have permeable fences so animals can get across the road as quickly as possible and not get trapped where they'd be hit by vehicles," says Weigand.

And of course landowners, communities, and homeowners need fences to keep elk from ravaging haystacks, wolves and other large carnivores from preying on livestock, bears from raiding garbage bins and chicken coops, and urban deer from damaging gardens and shrubbery.

In Montana, good fences still make good neighbors. It all depends on who the neighbors are, and whether the fence is supposed to keep domestic animals in, let wild animals through, or—ideally—do both.

FWP's free booklet, A Landowner's Guide to Wildlife-Friendly Fences, *contains detailed designs and diagrams for many different fencing adjustments and modifications to reduce wildlife injury and migration blockage. Get a copy of the popular publication by calling any FWP office or by downloading the PDF from the FWP website (fwp.mt.gov). Under the "Hot Topic Info" box on the right side of the home page, first click on "Fish and Wildlife Links," and then select "A Landowner's Guide to Wildlife-Friendly Fences."*

Landowners may receive additional wildlife-friendly fence modification information as well as help with design and even cost-sharing through FWP's Private Land Technical Assistance Program. For more information, call (406) 444-3798. Landowners can also ask their local FWP wildlife biologist or game warden if they know of any sportsmen groups or other organizations interested in volunteering labor for wildlife-friendly fencing projects.

SIMPLE SOLUTIONS Methods for providing safe passage for wildlife depend on the species and type of fence. Clockwise from bottom: If a few rails are temporarily lowered or removed during spring and fall migration, pronghorn can move easily through a jackleg fence; plastic cards clipped to the top wires can prevent flying sage-grouse from crashing into fences during low-light flights; though more expensive than other options, a gate built into a woven-wire or sheep fence can be opened to allow easier passage for pronghorn and other wildlife (as well ranch workers and their dogs).

TOP TO BOTTOM: DIANA LEVASSEUR; JACK BALLARD; JUDY WANTULOK

The great spring gamble

by Bruce Auchly

This time of year, it's usually still winter in much of Montana. Not always, though. Early last April, for instance, spring came at us like a high-speed freight train.

Lilac bushes were beginning to leaf. Meadowlarks were singing. Gophers were running around. Bluebirds were flashing their electric color in front of windshields.

ILLUSTRATION BY E.R. JENNE

All reliable signs that winter was over.

Each one of us has a peg to hang our seasonal hat on that signifies spring is approaching. And while we humans pay attention to the calendar and weather forecasts, plants and animals recognize spring by daylight length.

That's not surprising. Despite all the variables in the environment from year to year, only the steady increase (spring) or decrease (fall) in seasonal day length remains constant. That's because Earth never stops its steady rotation on its axis around the sun.

Bird behavior, like migration and nesting, is influenced a bit by weather. Yet even wet and cold spring conditions can't stop bird migration for long. Longer days mean a bird's just gotta fly north.

But what do birds do when they arrive in Montana in early spring and find ice, snowdrifts, and wind chills below freezing?

Some die, but many species have evolved to survive late-winter storms. For instance, robins that have begun to disperse to nesting areas go back into their winter flocks. They head to areas around open water, like the Missouri River, which can be warmer or at least out of the wind. Riparian areas also offer insects, which means food to help ward off the chill.

Most songbirds don't start arriving this far north until May. Bluebirds are an exception, wintering from Utah and Arizona south through Mexico and arriving in north-central Montana in mid-March.

Several websites offer information on spring migrations. The Cornell Lab of Ornithology and National Audubon Society co-sponsor ebird.org, a site that maps weekly movements by species. Another is the American Birding Association's website, aba.org. On the home page, click on "Birding News," then scroll down to "Montana" for the latest sightings by fellow birders.

Warm weather in early spring draws out insects, a bounty for species like bluebirds. But a really bad spring snowstorm can mean no insects and conditions harsh enough to kill bluebirds.

Red-winged blackbirds, robins, and meadowlarks can survive cold, wet spring weather better than bluebirds can, because they don't rely solely on flying insects. They find food such as seeds and crawling bugs on the ground. Even so, day after day of a lingering cold snap will take its toll on all returning migrants.

So why risk death just to be the first to arrive?

The early bird gets the worm, of course. But more important, the early bird gets the prime nesting real estate, which means a better chance to successfully hatch its eggs and raise its young.

So a bird can arrive early and hope the weather doesn't take a turn for the worse. Or it can arrive late and hope that some decent nesting sites still remain.

Either way, it's a gamble.

Bruce Auchly manages the FWP regional Information and Education Program in Great Falls.

American crow

Corvus brachyrhynchos **By Julie Lue**

As days grow warmer and snow recedes, exposing the detritus of winter, you're likely to find the American crow hard at work with the rest of nature's recycling crew. This large, dark, rowdy bird takes advantage of any available food source, whether it's a tattered deer carcass along a highway or a discarded french fry in a restaurant parking lot.

We may find little to admire about crows' foraging habits, especially when they rip open garbage bags or steal food off picnic tables. But in some ways the crow's survival strategy resembles ours. Instead of specializing in one particular food or habitat, it adapts to a wide variety of conditions by modifying its behavior, working cooperatively with other family members, and even using tools.

Crow or raven?

Both the crow and its cousin, the raven, are big, black birds with glossy feathers and raspy voices. The crow is smaller, has a slimmer, pointier beak, and is much more likely to travel in a flock (historically known as a murder). The raven is considerably larger—sometimes weighing twice as much as a crow—with a large, slightly curved bill and a necklace of shaggy feathers. It usually flies alone or in pairs.

From a distance, it's easiest to tell the difference by the shape of their tails in flight. A crow's tail appears somewhat squared-off or gently curved, like a fan. A raven's tail is longer and tapers to a point, like a wedge.

Also, crows usually live in towns, cities, and agricultural areas, avoiding the desert and mountain domains of the raven.

Family life

Crows enjoy an active family life. They can breed at age two but often stay with their families for up to five years. They help raise younger brothers and sisters while continuing to learn from their parents. Later, they may return for visits when sick or hurt.

Julie Lue is a writer in Florence.

Crows mate for life and build a new nest each year in a conifer or other tall tree. The female lays three to nine eggs, which hatch in less than three weeks. After a month or so, because they haven't yet learned to fly, the young crows tumble out of the nest onto the ground. Young crows are about the same size as adults but have milky blue eyes. If you find a fledgling on the ground, leave it alone. Its family is likely nearby, ready to fend off predators during this especially vulnerable period.

Food

Roadkill provides the crow with much-needed fat and protein, but most of the bird's diet comes from fruit, earthworms, grubs, nuts, grain, garbage, and baby birds of other species.

Voice

Scientists have identified over 250 different crow calls, including clicks, caws, rattles, and coos. Crows use a softer, gentler-sounding dialect when communicating closely with family members.

The raven, also an accomplished vocalist, often relies on a long, drawn-out croak that makes it sound like a crow with a sore throat.

Both species can mimic human speech.

Range

In Montana, crows live year-round in all but the northeastern corner of the state, which they abandon in winter for points south.

Intelligence

The crow's use of different food sources and habitats, along with its complex social life, has required it to develop an impressive brain. Scientists often compare the crow's intelligence to that of chimps or dolphins.

Scientific name

Corvus is the Latin word for "crow" and ***brachyrhynchos*** is Greek for "short-billed."

Inquisitive and adaptable, crows use their wits to procure food in unconventional ways. They can fish insect larvae out of holes with sticks, drop nuts on hard surfaces to crack the shells, and work as a team to steal food from distracted dogs.

Crows also apply their intelligence to identify and communicate threats. If you annoy a crow, it can recognize your face and your car, memorize your schedule, and even bring in reinforcements to harass you. When a crow dies, other crows will hold a "funeral." A flock gathers around the body, observes for a while, then flies away, perhaps after learning another lesson about dangers to crows.

Conservation status

Like rats, squirrels, and white-tailed deer, crows do well around people. Their numbers worldwide have steadily increased alongside growing human populations and expanding urbanization. In the eastern United States, crows suffered heavy losses from West Nile virus, a mosquito-borne disease that arrived in this country in 1999. Initially the virus killed nearly 100 percent of the crows it infected. But as it spread westward, the disease became less lethal to crows.

In Montana, crow populations are considered healthy and at no risk.

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PARTING SHOT

WELL-ARMED AMBLER A porcupine makes its way across a field in central Montana, where populations remain strong. That's not the case in western Montana's mountainous forests, however. See page 10 to learn what researchers there are finding (and not finding). Photo by John Warner.

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